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McKinley's Prophetic Vision—His Policy Abandoned

IN HIS last speech, delivered at Buffalo, Sept. 5, 1901, the day before the bullet of an anarchist laid him low and caused millions of people of many lands to bow in tears, Wm. McKinley uttered words of wisdom which apply to present conditions even more forcibly than they did to those of 13 years ago. He said:

"We have a vast and intricate business, built up through years of toil and struggle, in which every part of the country has its stake, which will not permit of either neglect or undue selfishness. No narrow, sordid policy will subserve it. The greatest skill and wisdom on the part of manufacturers and producers will be required to hold and increase it. Our industrial enterprises, which have grown to such great proportions, affect the homes and occupations of the people and the welfare of the country. Our capacity to produce has developed so enormously and our products have so multiplied that the problem of more markets requires our urgent and immediate attention. Only a broad and enlightened policy will keep what we have. No other policy will get more. In these times of marvelous business energy and gain, we ought to be looking to the future, strengthening the weak places in our industrial and commercial systems, that we may be ready for any storm or strain."

President McKinley went on to advocate the adoption of "sensible trade arrangements" which would not interrupt our home production, but would extend our foreign commerce. "Reciprocity," he added, "is the natural outgrowth of our wonderful industrial development under the domestic policy now firmly established. The period of exclusiveness is past." Then, with all the impressiveness of his intense Americanism, he advocated the upbuilding of the merchant marine. "We must have more ships," he declared. "They must be under the American flag, built and manned and owned by Americans." He also asserted that "we must build the Isthmian canal".

In almost exactly 13 years, the storm came and the country was not ready for it. With the exception of the building of the Panama canal, almost nothing has been accomplished in the direction outlined by the martyr president. No important trade arrangements have been made with foreign nations.

The policy of protection has been abandoned—not modified, as McKinley suggested, by the policy of reciprocity.

At the time of the opening of a great war, the nation was found without a merchant marine and nothing at all adequate to meet the demand for American ships has been done

It is high time for the people of the United States to wake up and adopt definite, positive measures to develop more fully the resources of the country and extend its commerce to foreign lands.

With profound sympathy for the people of other nations who are engaged in the most destructive conflict in the history of the world, the United States does not intend to enter upon any sordid policy. The "period of exclusiveness" will never return, but to a greater extent than ever will the American people strive to develop their own strength, which means to increase their usefulness to all the world.

To this idea of broad Americanism this number of THE IRON TRADE REVIEW is dedicated and an effort is made to point out a few methods by which the greatly desired results can be hastened.

America and the Import Problem

The Facts Relative to This Country's Resources and Needs—What Legislative Assistance is Required—Possibilities for Coal Tar Industry—Industrial Independence Impossible

BY R V SAWHILL

INDUSTRIAL independence is alliterative and alluring. Just now there is a demand to make it American. Boards of trade, commercial organizations, consumers, producers, government bureaus and many other organized bodies have studied the question and each one has propounded some suggestion for replacing an imported article with a domestic one.

Many, however, have found the search disappointing. The Chicago Association of Commerce has bent every effort for months to bring American consumer and producer together. Taking a measure of the results, we find substitution of American goods in a few lines like photo plate glass, toy music boxes, watch crystals and water color paint brushes, the latter being now made from hair growing in the ears of American cows. A Cleveland Chamber of Commerce representative said they had been working along this line for three years, but he could not give an example of what had been accomplished.

The United States Geological Survey, the natural clearing house for this information, states: "Although up to the present time the items of interest in connection with the substitution of domestic mineral products for those of a similar nature imported from abroad, have been chiefly in the line of inquiry rather than actual exploitation, there are a few instances where the use of domestic material has already begun."

Some prolix but poorly informed writers have berated the American business man for neglecting this country's resources of tin, manganese and potash, when it is a fact that the absence of a very few such resources has prevented complete industrial independence. Potash deposits of consequence, however, may be developed in the Searles Lake district in California.

The United States approaches closest to independence industrially of any nation. However, it will never attain an absolute divorce from dependence on other nations. It is not unreasonable, though, to expect that it can increase its present degree of independence.

It is pleasing to patriotically view a rising skyscraper as the product of American iron mines, blast furnaces, steel mills and fabricating shops. It takes away some of the flavor to realize that a little manganese ore from Russia or India or Brazil had to be secured or there would have been no skyscraper.

To those who resist the fetish of a foreign label, it is unpleasant to reflect that clothes they wear come from American sheep which pastured on fields enriched by German fertilizers and were colored in American mills with German dyes.

Centuries ago each community lived almost entirely on the products it could wrest from the surrounding country. The drift of civilization with its establishment of better means of communication between nations has altered this condition until now each nation is interdependent on the others. A completely self-contained country is impossible.

With its wealth of resources, both agricultural and mineral, this country could exist the longest if waterways and boundaries became impassable. It is due, in a measure, to its very wealth that efforts are now necessary to develop what resources are still latent. Where other countries were favored in a particular product, this country in some instances, has bought their goods to the exclusion of its own resources. It is in these products that patriotic development must come.

Opinions on the methods to be followed vary. Germany's commercial progress owed a great deal to the fostering guidance of its government. American capitalists naturally are reluctant to invest money in an industry whose existence depends on Europe being at war. With protection against foreign goods guaranteed until the infant American industry could stand on its own feet, these capitalists would be encouraged to supply the funds needed.

In general, it is safe to say, that most American business men regard an adequate tariff wall of primary importance. The opinions of representative business leaders given elsewhere in this issue, amply confirm this statement.

Others see the need of a stringent anti-dumping clause to prevent foreign merchants from overloading the American market in dull times. Changes in the patent laws, independence in ocean trade through an American merchant marine, a spirit of co-operation on the part of the government with a cessation of the attacks on business interests and a free labor supply are changes that others urge.

A careful study of the question of industrial independence leads inevitably to the conclusion that in most cases the American business man has utilized the country's resources in the fullest measure. In other cases, the ease of securing foreign goods has caused the American industry to languish. The opportunities for development are numerous but are fewer than is generally believed. For those industries in which opportunities for development exist, it is largely a question of the buyer. If American products are demanded, the producer will furnish them. In the new industries, the buyer for a time must bear his share of the burden.

Resources of the United States

WHEN the question is considered in the light of our mineral resources, it seems simple enough. This country is the world's greatest producer of mineral wealth, and in addition is possessed of a greater reserve of most of the essential minerals than any other nation. In a recent bulletin of the United States Geological Survey, it is stated that the only essential minerals of the first rank of which the United States has no known supply commensurate with its needs are nitrates, potash salt, tin, nickel, and platinum. This list comprises two essential mineral fertilizers and three of the most useful metals. When these are arrayed against the other much longer list of the minerals which are produced in this country, it is evident that in respect to mineral resources, there is no other nation in the world which so nearly approaches absolute independence.

The secretary of the interior, Franklin K. Lane, recently stated that: "A direct benefit to the United States from the European war will be its effect in making the people of this country realize to a greater extent the value of its mineral resources. It is entirely possible so to utilize these resources and expand our industries that the label 'Made in America' will become familiar in our own foreign markets. It has been easier and perhaps cheaper to import mineral products and materials from other countries, than to go to the trouble and expense of developing our own resources of the same nature. Forced to the latter course by the suspension of commerce from other countries, I believe that American enterprise and energy will turn to the development of the native resources rather than permit production to lag and supply to be diminished in any industry. To open these re-

sources to use means to make American industries using these materials, independent of the rest of the world.

"The supply of cheap foreign barytes has prevented the development of many good deposits of that mineral, but with the consumers on the Atlantic seaboard already looking for domestic supplies, some of the southern mines should be re-opened to supplement the output of those already in operation. The closure of the European market leaves but one buyer for the radium ores of Colorado and Utah, which is decidedly to the disadvantage of the miner.

"It is not generally known to what an extent we have been depending upon Europe, principally Germany, for many of the chemical products derivable from coal and which we have been permitting to go to waste in the most reckless manner. Coal tar, obtained in the manufacture of coal gas and of coke in retort ovens is capable of producing hundreds of chemical products but the chemical industries dependent upon coal tar as a raw material have had little development in the United States. Our imports of coal tar products in 1913 were valued at $11,000,000, at initiating points and when they reached the ultimate consumer probably cost double that amount. If the present war continues any length of time, the American consumer will have to do without aniline colors and dyes, certain drugs, and numerous other coal tar products or the American manufacturers will undertake to supply these essential commodities which have hitherto carried the label 'Made in Germany.'"

Work of the Geological Survey

ONE branch of the government at Washington which has devoted itself to this question of industrial independence is the Geological Survey. In various bulletins it has discussed the effect of the war on such products as potash, manganese, tin, flint pebbles, arsenic, antimony, and barytes, as well as on the exports of copper, zinc and radium. An idea of some minerals which it has been generally believed were not native to this country, is afforded by the titles of a few of these bulletins: "Potash in Western Saline Deposits," "Nitrate Near Melrose, Mont.," "Late Developments of Magnesite Deposits in California and Nevada," "A Baryte Deposit Near Wrangell, Alaska."

The following interesting example serves to illustrate the work which the Geological Survey has done since the outbreak of the war in serving as a clearing house for American manufacturers and consumers. Several weeks ago a letter which was stamped 371,353 was received from a firm of wholesale druggists who were inquiring for the names of manufacturers who had taken up the question of making medicinal oils, formerly imported from Russia, from American petroleum. The next letter, No. 371,354, came from an oil refining company which stated that while it previously had been the largest importer of oils of this character, immediately after the war had broken out, it had equipped its plant for producing medical oils of the same quality as those previously imported.

The array of figures showing our mineral wealth are impressive. The average value of the mineral production of the United States now reaches $2,500,000,000 a year. This figure is so high as to render comparison with other countries valueless. This country's coal mines produce nearly 40 per cent of the world's output. More than 65 per cent of the petroleum produced in the world in 1913 came from this country.

A consideration of the essential metals is also satisfying. Of the world's output of iron ore, 40 per cent is mined from American deposits, while the smelters of this country annually turn out 55 per cent of the world's supply of copper, and at least 30 per cent of the lead and zinc. It is comforting to reflect that this nation's resources seem to be in no danger of depletion. Twenty-five years ago the mineral bauxite from which aluminum is derived, was valued so lightly as to not be mentioned in government reports. It is only within the last few years that the carnotite deposits of Colorado and Utah have become valuable as a source of radium.

What the Imports Are

THE imports of both crude and manufactured mineral products in 1913 exceeded $270,000,000. Raw materials and crude metals included in this total probably were valued at $200,000,000. The value of these imports was only about 8 per cent of the domestic output. It is of interest to glance over the imports, keeping in mind those products of which there are known supplies in this country. The larger items in the import list named in the order of their value are: Unmanufactured copper, precious stones, nitrate of soda, copper ore and matte, nickel, tin, iron ore, pig iron and steel, petroleum products, manganese ore and alloys, platinum, aluminum, pyrite, graphite, stone, potash and magnesite.

It is estimated that the imports of manufactured or partly manufactured metals largely exceed in value the ores and crude metals brought into this country for domestic manufacture, and that in our exports a somewhat similar ratio exists between crude materials and manufactures, thus presenting a double opportunity for increasing the extent of our metal industries for both domestic consumption and export. Copper is refined in this country to a considerable extent from ore and matte coming principally from Mexico, Canada and Peru. Canada furnishes the nickel ore, Cuba a considerable proportion of the iron ore, while the largest metallic contribution from Europe are the ores of manganese and the ferro-alloys. Foreign lead and zinc, largely from Mexico, are imported to the extent of $5,500,000 annually. Platinum at this time is produced largely from Russian ores and concentrates, Colombia being the only other known foreign source. The sources of the antimony, arsenic and bismuth consumed in this country are largely foreign.

Mineral Fuels

IN MINERAL fuels, domestic producers of coal and petroleum have never been forced to face foreign competition in holding the home market. This country's production of coal has for many years so completely outstripped that of other nations, and the available reserves are so immense that American coal producers have to consider the question of meeting foreign competition on alien ground and not in the domestic market.

Importations of petroleum have been in considerable value for several years, but have not reached the proportion where their effect on domestic producers was important. Petroleum has been imported in large quantities from Mexico for use as a fuel, particularly on the eastern coast, but this fact has been more than offset as the Mexican product replaced oil produced in this country which is capable of higher utilization. Benzine and gasoline have been shipped annually to the Pacific coast from Borneo to the extent of 15,000,000 gallons, valued at about $1,000,000, but the development of additional resources in that territory renders future importation from Borneo improbable.

The Ferro Manganese Problem

THE ferro-alloys, particularly ferro-manganese, are to steel making what a cake of yeast is to the baker. It was this question of securing ferro-manganese that was most forcibly brought to the attention of American steel producers immediately after the outbreak of the war. The largest producers of manganese ore have been India, Russia and Brazil. Of the ferro-manganese and spiegeleisen used in this country in 1913, 36 per cent was furnished by imports, furnished largely by England and Germany. Most of the ferro-manganese produced in this country is utilized by the

manufacturing steel companies for their own purposes and is produced from imported manganese ore.

There are available sources of manganese ore in this country but the production has always been negligible. The total output in this country since 1838 is 415,000 tons compared with imports in 1913 alone of 345,000 tons. Commercially, materials containing manganese are divided into four classes: Manganese ores, manganiferous iron ores, manganiferous silver ores, and manganiferous zinc residuum. The manganese of commerce is derived chiefly from material containing either polianite, pyrolusite, psilomelane, wad, manganite, brannite, and franklinite.

Manganese ore to be commercially available must contain at least 35 per cent of manganese as well as a fixed amount of iron, silicon and phosphorus. Domestic manganese ore is found in many parts of this country, the most abundant deposits being in the Appalachian and Piedmont regions of Virginia, the southern Mississippi valley and the Pacific coast, together with small deposits in the New England, Rocky mountain and Great Lakes regions. The principal producing districts up to the present time have been located in Virginia, Georgia, Arkansas and California; the former state being the only one in which manganese ore has been mined in quantity for a number of years.

Efforts have been made at different times to develop the deposits of manganese ore in this country, but up to this time they have not been particularly successful, owing to the pockety nature of the deposits. Considerable exploration work has been done in the Virginia deposits with only indifferent success. A representative of a large Ohio chemical firm returned a short time ago from an investigation of the Virginia field and reported that the ore was of little use for his company, which requires an ore containing 1 per cent or less of iron. This firm has been selling about 10,000 tons of manganese ore to the glass trade annually.

Manganiferous iron ores consist of mixtures of manganese and iron oxides and hydrous oxides, the manganese content varying, although it is usually in excess of 5 per cent. The proportion of iron in these ores is large and usually exceeds 40 per cent. These ores are found in relatively large quantities in the New England, Appalachian, and Lake Superior regions. Within the last few months, the American Manganese Mfg. Co. has begun at its Dunbar, Pa., blast furnaces, the smelting of the manganiferous iron ores secured from its properties on the Cuyuna iron range in Minnesota. From the Leadville silver ores and from the New Jersey zinc ores, spiegeleisen is produced. Unless additional deposits of manganese ore are located in this country, it is unlikely that the country's dependence on foreign sources for its supply will be relieved.

Ferro on the Pacific Coast

The Noble Electric Steel Co., San Francisco, Cal., shortly after the beginning of the war, prepared its electric steel making plant at Heroult, Cal., for manufacturing ferro-alloys. Californian deposits of manganese and chrome ore exist in sufficient abundance to supply a local smelting industry, but the small demand on the Pacific coast, coupled with high freight rates to the east previously have retarded the development of this industry. The Noble company expects to find a market for its ferro-alloys not only among steel works on the Pacific coast, but also in Japan.

A substitute for ferro manganese in the form of manganese ore is reported to have been used by the Burr Co., Champaign, Ill. The ore is ground and used in the company's gray iron foundry in making semi-steel. The ore is used in comparatively small pieces and the effect on the semi-steel is said to be practically the same as ferro-manganese. The pieces average 1 inch in diameter. The ore analyzes approximately 6.50 per cent silicon; 5.45 per cent iron; 51.45 per cent manganese, and 0.09 per cent phosphorus. An allowance for the reduced manganese content is made when charging this ore.

Importance of Chemical Industry

FEW problems associated with the question of a self-contained America are as big and as productive of speculation as that of manufacturing in this country on a large scale, the chemicals which we have been accustomed to import from Europe. With the abundance of raw materials which this country possesses, it is well known that their production is technically possible. The ramifications of industrial chemistry are so numerous that the question of competing with the highly specialized chemical manufacturers of Europe, fostered as they have been by governmental co-operation, is largely one of economics.

Deprived of any assurance that protection will be guaranteed against the competitive efforts which European manufacturers will make to regain their lost commercial laurels after the righting of the present abnormal business conditions, it is not surprising that American capitalists are loath to finance an industry, the incipient development of which may terminate with the end of the present war. In other words, the American business man refuses to be both enterprising and eleemosynary. He feels that he should have a reasonable assurance that the heavy initial outlay of capital will be protected until the time is reached when the American chemical industry will have grown to such proportions that it can protect itself in the markets of the world.

The importance of the chemical industry cannot be overrated. It is conceded that the industrial independence of any country depends upon its manufactures and agriculture. Chemistry contributes in an important measure to both of these. It enables the farmer to correct the bad qualities of the land he cultivates and also assists the manufacturer in converting the metals from the various forms in which they are found in the earth, to other forms which render them suitable for commercial use and ornament.

Probably no other industry offers the same degree of prospective development. Through a system of close co-operation between manufacturers engaged in all of the many phases of industrial chemistry, Germany for many years has occupied a position of pre-eminence in this line. This condition was sharply brought to the attention of American manufacturers immediately upon the outbreak of hostilities.

One branch which offers almost unlimited possibilities for utilizing American products is that based on coal tar, a raw material produced in abundance from American gas and coke retorts. Commercial production of coal tar in this country in 1912 was about 125,000,000 gallons, approximately 1,000,000,000 pounds, to which should be added the tar which is burned at many works as fuel or allowed to go to waste.

The extent to which this tar is now manufactured in the United States is practically limited to simple distillation for recovery of the light oils, such as gasoline, creosoting oils and pitch. Coal tar is the raw material from which carbolic acid is manufactured and crude tar contains about 10 per cent of this chemical. No carbolic acid, however, is made in this country, the acid in the tar going into the creosoting oils used in the preservation of railroad ties, bridge timbers and other woods which are exposed to the decaying action of air and water.

Exports of coal tar in 1913 were 36,500,000 pounds, 30 per cent of which went to Germany and 20 per cent to Belgium, for which this country received $150,000. Of carbolic acid alone, imports into this country in 1913 were over 8,000,000 pounds, one-third of which came from Germany, and exclusive of freights, commissions and profits, the price paid for this acid was $675,000. Altogether, chemical products of coal tar, including dyes, colors and medicinal preparations imported in 1913, were valued, duty paid, at $12,000,000 at

point of shipment. The need for a certain supply of aniline dyes has been realized acutely during the past few months.

World's Trade in Chemicals

A SHORT review of the salient facts in reference to the chemical industry of the world is highly instructive in showing what American manufacturers must be prepared to face in meeting competition from a highly specialized foreign industry which is favored by governmental aid. Of the number of coal tar dyestuff works in the world, all but nine are located in European countries. Of these 22 are in Germany, 11 in France, 11 in Great Britain, four in Austria-Hungary, four in Switzerland, two each in Holland and Russia, and one each in Belgium, Greece and Italy. There are nine in the United States.

Taking Germany's trade for 1913, it is found that of products made from coal tar by distillation, the imports were 67,500 metric tons and the exports were 343,000 tons, a balance of trade in her favor of 275,500 tons. Of goods obtained from these products by chemical transformation, Germany imported 673 tons and exported 16,311 tons, a balance of trade in her favor of 15,638 tons. Of the dyes made from these secondary products, Germany's imports were 3,238 tons and her exports were 163,874 tons, or an excess of exports over imports of 160,636 tons.

Germany's pre-eminence in the world's trade in chemical products, lies in her control of those which are obtained by chemical transformation from primary coal tar products. The output of chemical factories is so diversified and each of the hundred or more products is so dependent upon one or more other products that the coal tar dye industry is really made up of many separate parts, each interdependent upon the other. Of the 22 factories in Germany, none is independent of the other but the entire group is independent of the world at large.

A glance at the aniline dye industry alone, is illuminative as showing what return American investors could expect from the establishment in this country of a self contained dye works, making the 700 or more different aniline dyes. Imports of these dyes during the fiscal year 1913-1914 were $7,500,000. A factory equipped to manufacture all of these 700 different aniline dyes, therefore, would average a gross annual income from each of only about $10,000. To thus establish at one step a factory equipped to turn out each of these 700 products, would require a large initial outlay. The total net returns after the business had been satisfactorily developed, would be large, but the average return from each of the many different products would be small.

Building Up An Industry

SPECIFIC remedies necessary to build up the chemical industry were outlined in a recent report of a special committee of the New York section of the American Chemical Society. They are of value to iron and steel manufacturers as the recommendations apply with equal force to other lines of trade. The report in part is as follows:

"Alterations of our tariff law are inevitable and the consumers in the first place and the public in general must share in the burden thus imposed. Under existing circumstances, private enterprise and private capital have gone their limit. They have reached the limit for two reasons: the explosive, dye and similar industries abroad are in a state of high development and of refined organization, and are financially the best suited to carry on an offensive campaign against any nation attempting to take business away from them. Second, domestic manufacturers are prohibited by law from making use of co-operative commercial devices, such as pools, trusts, manufacturing and selling agreements, and the like, whereas such devices are wholly lawful abroad and are encouraged by their respective governments. In other words, the American chemical industry is expected to cope with the foreign industry while both its own arms are tied behind its back and its opponents have full and free use of their arms.

"The remedies required would be an effective anti-dumping clause that would certainly prevent underselling of domestic manufacturers in the United States by unfair methods. According to the best information that your committee can gather, such an anti-dumping clause alone would not be sufficient, however, to create complete and independent domestic coal tar explosives, dyestuffs and medicinal industries. It has been conclusively demonstrated during the past 30 years that the present tariff rate of 30 per cent on dyestuffs is not sufficient to induce the domestic dyestuff industry to expand at a rate comparable with the consumption of dyestuffs in this country. A rate of 30 per cent ad valorem and 7½ cents specific would probably be sufficient to encourage and enable domestic manufacturers to expand their operations to such an extent as to supply a very material increase in, if not the whole, of these commodities consumed in this country.

"This committee is a unit in the belief that an alteration in our patent laws aiming at compulsory working or compulsory licensing would not be any substantial benefit to this industry nor to the country as a whole. Twenty-nine countries have attempted compulsory licensing clauses and 56 countries have attempted compulsory working clauses, and the best information your committee can obtain is that in none of these attempts has there been any appreciable measure of success.

"This country can produce so-called coal tar raw material in amounts sufficient for the needs of a complete domestic coal tar chemical industry, provided there is a certainty of outlet as to volume and continuity. In other words, it is a closed circle. If the dye users will contract sufficiently with the dye makers, the dye makers will contract with the coal tar distillers, and the industry will take a start. The initiative rests wholly with the users; if they cannot afford to contract, the dye makers and distillers cannot afford to make their contracts and additional investments.

"Benzol, toluol, and the like are produced in sufficient amounts in present installments of by-product coke ovens to provide all of these things that would be needed for a coal tar chemical industry of a magnitude sufficient to supply the United States market; the separation of these materials from the gas that carries them is dependent upon the market and the demand therefor. There is no inherent defect in our coke industry with regard to the actual making of these things; the only question involved is whether it is more profitable to burn the benzol, toluol and the like contained in the gas as a fuel, than to separate them from each other for purposes of sales. Ample supply can be provided before any plant that can use benzol and the like for dyestuff making could be erected in the United States, and thereafter the supply of these materials can readily be kept up to any requirements."

The question of the government guaranteeing some form of protection to an industry which might be organized at this time to meet the commercial exigencies forced upon this country by the war in Europe, finds an interesting parallel in the recent action of the British Board of Trade. A recent statement of that board is as follows: "After consultation with the committee on chemical manufactures, appointed in August last, it appeared to the board advisable to take such steps as were possible to develop the immediately available sources of supply, and also to encourage the permanent manufacture of dyestuffs and colors in the United Kingdom on a large scale, so as to guard against any recurrence of the present difficulty.

"After preliminary consultations with representatives of some of the principal bodies of consumers, a meeting was held at the offices of the board which was attended by representatives of 22 important associations and firms engaged

in the color-using industries. There was laid before the meeting a scheme for the formation of a limited company with a large capital, of which the bulk would be subscribed by the consumers of dyestuffs and colors and others interested, the government indicating its willingness conditionally on this being done to subscribe a certain proportion of the share capital and to guarantee the interest on a large debenture issue for a term of years.

"The meeting was informed that preliminary arrangements had been made enabling His Majesty's government to acquire important dye-producing works in this country for the purposes of the new company, if established, and that the government would be prepared to take all necessary steps to secure the acquisition of any other concerns in the United Kingdom whose transfer to the new company might be desirable."

New Plants Being Built

ANOTHER angle to the development of the American coal tar industry is seen in the case of the Benzol Products Co. This concern began some time ago to manufacture aniline oils in this country and the foreign interests which had for many years monopolized this trade decided that the American company should be put out of business. In the face of a 10 per cent tariff on aniline oils, foreign makers reduced the price to a point where it was impossible for the American concern to compete.

Since the outbreak of the war, this company has announced its plans for erecting a plant for making dyes. It has purchased 75 acres at Marcus Hook, Pa., and will erect three buildings, one 75 x 360 feet, three stories high; one 60 x 300 feet, two stories high, and another 80 x 547 feet, 2 stories high, all of brick and concrete. The products will include aniline oils, salts and colors. It is understood that several other companies have already begun the installation of equipment for manufacturing coal tar colors which heretofore have been produced in this country on only a small scale.

The American Tar Products Co., Woodward, Ala., is another company whose intention to develop the coal tar industry in this country has attained fruition since the beginning of the war. This company, it is understood, has built a plant near the coke ovens of the Woodward Iron Co. It will buy tar from the Woodward company to be utilized in making creosote.

Gas Mantles

Another phase of the chemical industry can be seen in the manufacture of gas mantles. Nitrate of thorium is required in manufacturing mantles, the thorium ore coming chiefly from Brazil. However, the chemical re-agent for reducing thorium to a nitrate has been brought in from Germany and Austria. As a result Brazil exported thorium ore to Europe and we bought nitrate of thorium from manufacturers in those countries. The Welsbach Co. began some months ago to accumulate a large supply of thorium ore. It is reported that this company has enough of this ore in stock to supply the country's demand for mantles for many years. Immediately following the serving of Austria's ultimatum on Servia, the Welsbach Co. began an industrious campaign to procure a large supply of the chemical re-agent. Enough was secured within a few days to insure full operations for at least a year.

War and New Industries

AN ILLUSTRATION of American enterprise frequently cited is that of Thomas A. Edison and his carbolic acid factory at West Orange, N. J. This acid is an essential ingredient in making phonographic records and his importations of this product previous to the outbreak of the war averaged a ton and a half a day. The supply came from Germany and was effectually shut off at the beginning of hostilities. Convinced that carbolic acid could be made synthetically, Mr. Edison began a study of the various methods of making carbolic acid known in this country, but previously not utilized commercially. Having satisfied himself as to the best method of making this product, he had plans drawn for a factory and eighteen days after the plans were approved the plant turned out 700 pounds of carbolic acid. It is claimed that his success in producing this acid has been such that it will be profitable for him to continue its manufacture even after the resumption of importing facilities with Germany.

The Chicago Association of Commerce, which for some months has been devoting itself to the question of bringing American users of foreign articles into touch with American manufacturers, has these examples to offer. Photo plate glass formerly was imported from Europe and is now being produced by the Pittsburgh Glass Co., as well as other concerns who have machinery equipped for this purpose. Watch crystals were formerly a German product. The H. B. Fry Glass Co. and the Pittsburgh Bent Glass Co. now have installed the necessary machinery adaptable to this purpose and are turning out watch crystals for domestic consumption. Those tinkling little toy music boxes, for which the world has relied for years upon the inventive Swiss, since the outbreak of war have been manufactured by Mermod & Co., New York.

Using Open-Hearth Slag

Another lesson in the conserving of by-products is furnished in the recent decision of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., to erect a plant at its Ensley works, for the purpose of making fertilizer from open-hearth slag. The slags available from the open-hearth operations in the Birmingham district are high in phosphorus and for that reason are particularly suitable for fertilizers. They contain a considerable amount of phosphoric acid and lime. The finished product, it is said, will contain about 15 per cent of the former and 40 per cent of the latter.

In operation, the slag will be drawn from the open-hearth furnaces into boxes in which it will be cooled. It will be crushed, ground and bagged, the final bagging and grinding being similar to the process followed in the manufacture of cement. The iron contained in the slag will be removed magnetically. The plant will cost about $250,000 and will make available a by-product which heretofore has had little value.

American Piano Wire

The president of the American Piano Supply Co. declared in a recent interview that his company had successfully closed negotiations with an American music wire manufacturer for manufacturing that product in this country. Several American companies have been making piano wire for a number of years. The Supply Co., according to its president, also has made preparations to begin the manufacture of tuning pins, a product which previously has been imported.

Ball Bearings

One of the earliest manufacturers to take steps to resolutely confront the stoppage of German imports was the Hess-Bright Mfg. Co., Philadelphia. The bearing steel formerly used by this company in the manufacture of ball bearings had been imported from Germany. Within a few days after the declaration of war, this company had begun work on an extension to its plant

to enable it to manufacture bearing steel in its own works. The extension will be 35 x 199 feet, two stories high, with basement and of brick and steel construction. Work on the addition is being rushed.

Opportunity for Tin Smelters

TIN, the most important metal in which this country's reserves are negligible, offers an illuminating illustration of the troublesome emergencies which a country weak in the resources of one particular metal must be prepared to meet in securing at all times an adequate supply of this metal from neighboring nations. In a few days after Austria's advance on Servia, the price of tin jumped from 34 cents a pound to 65 cents a pound. This advance was due largely to the insecurity of ocean traffic, as England, which controls the bulk of the tin carrying trade, had not at that time offered government guarantee of ship insurance. Owing to the stoppage of manufacture in Europe and the consequent restriction of the market for bar and pig tin, the price has since dropped and is now at the July level.

The bulk of the world's supply of tin comes from the deposits in the Straits Settlements, which territory is under English control. The only other deposits of consequence are found in Bolivia and in this connection an interesting story is told which illustrates some of the difficulties which American manufacturers who have attempted to enter the tin smelting business have been forced to meet.

The tin deposits of Bolivia have increased in importance rapidly during the past three years and annual exports from that country to Europe now total between 30,000 and 40,000 tons of tin concentrates, carrying more than 20,000 tons of metallic tin. These concentrates are all shipped to Europe for smelting. Imports of tin into the United States last year were several times the Bolivian production and this country could easily have absorbed all the tin smelted from Bolivian ore.

A few years ago a smelter was established at Bayonne, N. J., to smelt Malayan tin ores, but when this fact became known, the English government placed a high export duty on Malayan tin ores not going to some parts of the British empire and the American smelter was forced out of business.

Provided with ships necessary to transport the Bolivian tin ore to this country, there is no reason why American tin consumers could not be rendered practically independent of the English tin monopoly through the establishment of American smelters for reducing Bolivian ores. It already has been proved that there are no metallurgical problems involved in the smelting of these ores which could not be met easily.

Known American deposits of tin are small, and the tin concentrate produced in 1913 in Alaska, as well as those produced near Gaffney, S. C., and Tinton, S. D., amounting to 84 tons of 60 per cent ore, were all sent to British smelters.

Zinc Dust

The war has already lent value to one product which for a number of years has been so little valued that as a general rule it has been allowed to go to waste. This product is the zinc dust, or blue powder, made in the zinc smelting process. This powder is used in the sherardizing process, and in dye works and mining processes and was imported largely from Germany and Belgium, about 500 tons being made in this country. The ruling quotation before the war was 6 cents a pound and at this figure it was not profitable to manufacture it in this country. The cheap labor employed about Belgian smelters was the principal reason for that country furnishing the United States with the bulk of its zinc dust supply.

Following the outbreak of the war, the price of this blue powder rose rapidly and for a time it was more valuable than zinc itself. As the result, several zinc smelters began to make this powder in an effort to secure the trade which had been drawing 2,500 tons of zinc dust annually from abroad. The New Jersey Zinc Co., the largest producer of zinc oxide in the United States, was one of the first manufacturers to begin turning out zinc dust.

Domestic Antimony Resources

MINING of antimony deposits of this country has not proved commercially successful on any extensive scale owing to the comparatively low price at which the refined metal can be imported into this country. On an average yearly range, antimony sells from 8 cents to 9 cents a pound and at these prices antimony ores cannot be worked profitably under the high labor cost prevailing in mining regions in this country, unless the deposits prove larger and more advantageously situated than any discovered up until this time.

Considerable antimony is annually recovered in this country from antimonial lead, while small quantities are recovered in the electrolytic refining of copper and lead. The greater part of the metal, however, used in this country is secured from English smelters, using ores from Chinese, Mexican and French deposits. In 1906 and 1907, and again this fall, prices of antimony reached the high level of 20 cents a pound. At this level, it no doubt would prove profitable to mine the deposits of stibnite (antimony sulphide) found in Arkansas, Nevada, Idaho, Washington, California, Utah and Oregon. The doubtful question of government support to a domestic antimony smelting industry, coupled with the high labor cost, will doubtless deter the establishment of any smelters in this country.

Magnesite

The principal supply of magnesite in this country is found on the Pacific coast and the chief consuming points are on the Atlantic coast. The high cost of transportation has militated against the use of these domestic reserves. Since the outbreak of the war a small quantity of magnesite has been shipped from California to the eastern coast via the Panama canal. Austria furnishes this country with the bulk of its magnesite supply.

Cadmium as a Fire Fighter

EVEN the automatic fireman has not been inclined to work without a little assistance from Germany. The sprinkler nozzles on the water pipes are closed by plugs of a metal alloy which melts at a very low temperature. The metals used in the alloy are lead, tin, bismuth and cadmium. The latter metal is also used in electrical fuses. Germany is the principal producer, the output in that country in the last few years having averaged between 90,000 and 100,000 pounds annually, selling at 43 cents to 67 cents a pound. Imports of cadmium into the United States have averaged from 4,000 to 14,000 pounds of stick cadmium annually, but in 1913 the imports dropped to 1,656 pounds, valued at $1,232. Metallic stick cadmium has been produced in this country since 1907. Three American firms are now making cadmium in the form of either metallic stick cadmium or the pigment, cadmium-yellow.

It was known as early as 1886 that cadmium was present in the flue and bag-house dusts of lead smelters treating ore from Leadville, Colo. This metal is almost universally present in zinc ores. In zinc concentrates from the Joplin regions, the ratio of cadmium to zinc is

1 to 162. When lead ores containing small quantities of cadmium are smelted in the blast furnace, the cadmium distills over into the bag house together with arsenic, lead and antimony. When these dusts are charged again into the blast furnace, most of the lead and antimony will be recovered in metallic form, but the arsenic and cadmium will again go over into the bag house. In time, the fumes will be very much enriched in arsenic and cadmium. This fume is treated for arsenic and the cadmium is recovered from the residue.

Graphite

IN A publication issued by the Geological Survey shortly after the beginning of the war, it is stated "the cutting off of the foreign supply of graphite should seriously affect only the crucible industry. There is an ample supply of graphite in this country suited for stove polish, foundry facings, and paint pigments, and large deposits of amorphous graphite in northern Mexico are controlled by American firms and can be depended upon for supplies of graphite for pencils, lubricating material, and many other uses. Moreover, graphite is now being manufactured in the electric furnaces at Niagara Falls in amounts far in excess of the domestic production from natural sources and this graphite is well adapted for most of the uses to which graphite is applied except crucible making."

The graphite used in crucible making has been brought largely from the island of Ceylon, although during the past few years some has been brought from Madagascar. Graphite used in crucible making is flaky or fibrous and has never met with serious competition from domestic graphite. Domestic supplies of flake graphite are practically inexhaustible and are found in New York, New Jersey, Pennsylvania, North Carolina, Alabama, Texas and some other states. The expense of concentrating this domestic graphite has been prohibitive. Graphite in these deposits occurs as small flakes in rocks composed mainly of quartz, feldspar and mica, the graphite constituting 5 to 10 per cent by weight. Several plants are now engaged in working these deposits and this field would seem to offer a likely source of development for an American industry in the event of a continued interruption of foreign importing facilities.

Fluorspar

The fluorspar used in this country comes largely from domestic reserves. The output in 1913 was 115,580 tons, valued at $736,286. Imports during the same year were 22,682 tons, coming largely from Great Britain and representing 55 per cent of the total English production. More than 80 per cent of the fluorspar used is absorbed in the production of open-hearth steel, although this mineral product is used also as a flux in blast furnaces, foundries, silver, copper and lead smelters, and in many other metal-working lines. This country's supplies seem adequate to meet any increased demand from domestic consumers.

Cement

The cement-making industry is forced to meet little competition from abroad. Domestic production in 1913 was nearly 93,000,000 barrels, while imports were only 84,630 barrels. This country's supply of materials for making cement is practically inexhaustible.

Barytes

Of barytes, domestic production in 1912 was 37,500 short tons of an average value of $4.09 a ton, while imports were 26,186 short tons, valued at $2 a ton. In 1913, domestic production was 45,300 short tons of an average value of $3.45 per ton, while imports were 35,840 short tons, having an average value of $1.71 a ton. The principal sources of supply of barytes are Missouri, Georgia, North Carolina, Tennessee, South Carolina and Virginia. Other deposits are scattered over the eastern and far western states.

One company in the United States which has been using barytes imported from Germany was forced by the breaking down of ocean traffic to use the domestic material and already has made arrangements for securing a regular supply from the deposits in the southern states.

Iron Ore

When considering the question of the importation of iron ore, it is highly improbable that the European war will have any effect in permanently altering the present routes of trade in that commodity. Cuba furnishes the bulk of the imported iron ore used by blast furnace operators in this country, Canada being second in importance. Iron ore from Norway and Sweden is used by some operators along the Atlantic coast, but importations from other European countries such as Spain and Greece are negligible when compared with the immense quantities of iron ore annually smelted in this country. Deposits of Chilean iron ore are now being developed by an American company, while it is highly probable that in the course of a few years the immense tonnages known to exist in Brazil will become a factor on our eastern seaboard. This country is so rich in its reserves of iron ore that the question of meeting foreign competition is one that need not seriously be considered. Furthermore, the development of an all-water route from Buffalo to New York and from Lake Champlain to tidewater is expected to make available to eastern manufacturers iron ore from the Lake Superior district and from the Adirondack mountains.

Low Phosphorus Pig Iron

Imports of Swedish low phosphorus charcoal iron have fallen off since the beginning of the war. This iron has been used by American manufacturers of the highest grades of fine wire, tool steel, armament, projectiles, car wheels, rolls, etc. Some American makers of low phosphorus pig iron have shared this business and since the falling off of Swedish imports, production and sales of American low phosphorus pig iron have rapidly increased.

An example of one American company, which has proved equal to the task of producing low phosphorus pig iron comparable to the highest class Swedish grade, is furnished by Pilling & Crane, Philadelphia, in reference to their Chateaugay low phosphorus pig iron. This iron is produced at the Standish blast furnace of the Northern Iron Co. The ore from which it is produced has been mined for more than a century.

The ore deposit, which is located about four miles from the furnace, has been worked at various depths ranging to 1,200 feet below the surface. The ore in its natural condition is very low in phosphorus and through grinding and magnetic concentration, practically all of the phosphorus is removed with the gangue. A reduction in the phosphorus content has been gradually brought about through experimentation until the present output is said to range in phosphorus from 0.020 per cent down to 0.016 per cent.

The American Roller Bearing Co., Pittsburgh, expects to occupy its new plant on Melwood avenue, near Baum boulevard, about Jan. 15. The plant is equipped for the manufacture of roller bearings for all classes of machinery and includes a large heat treating department. Indications at present, the company states, point to the operation of the new plant at full capacity.

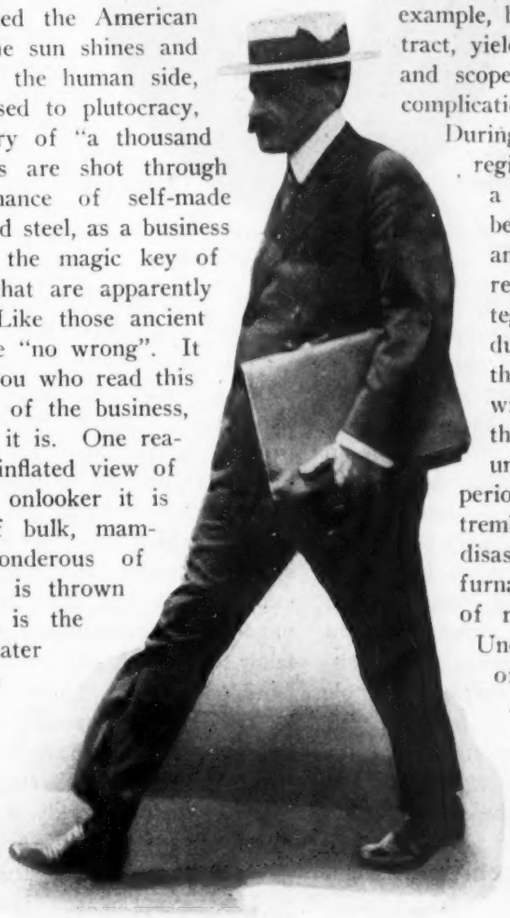
New Finance for Steel and Iron

How the New Federal Reserve System Can Be Utilized to Free Business from the Handicap of a Rigid Credit System Through the Employment of Acceptances in Liquidation of Debt

BY ISAAC F MARCOSSON

IN THE eyes of the average American who gets his ideas from the newspapers and popular magazines, the Empire of Steel is a sort of billion-bulwarked citadel practically immune from the ordinary hazards of trade. Especially if he happens to belong to the great army of small and every-day business men is his feeling toward the giant industry one of envy and admiration.

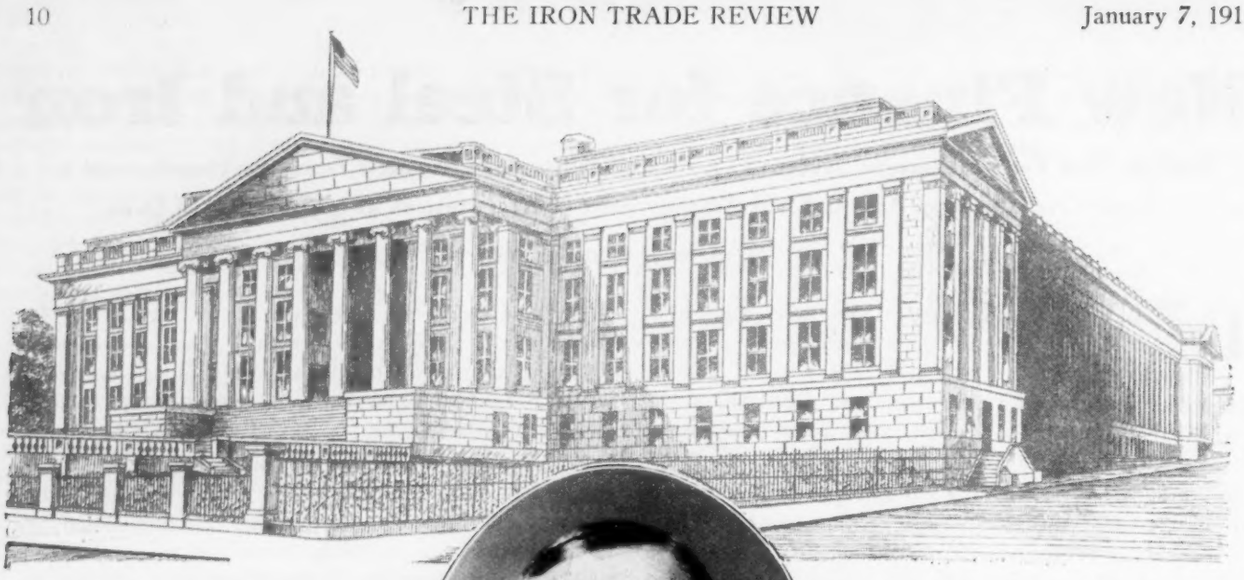
To this average American, the age of steel is also an age of strident and incessant prosperity for everyone involved. Wherever he turns in his ideal view of it—he finds something to pulse the blood and stir the imagination. As a spectacle he sees it throbbing with a vast energy; aglow with the glamor of fiery furnace licking the sky with tongue and flame. There passes before him an unending panorama of militant action that produces along with the metal of its needed output, the treasure of a fabulous income. He projects his vision and glimpses a world-wide achievement that has planted the American rail and girder wherever the sun shines and the trade winds blow. On the human side, he beholds the puddler raised to plutocracy, part of the glittering gallery of "a thousand millionaires", whose careers are shot through with the picturesque romance of self-made success. In a word, iron and steel, as a business proposition, seem to have the magic key of privileges and exemptions that are apparently trouble and worry-proof. Like those ancient kings, the industry can have "no wrong". It is a beautiful illusion, but you who read this article and who are in and of the business, know how far from reality it is. One reason, I might add, for this inflated view of steel is that to the casual onlooker it is instinctively big. Huge of bulk, mammoth of capitalization, ponderous of product, the whole activity is thrown upon a large screen. It is the throne of big men, the theater of immense operations; the battleground of masterful and conflicting ambitions. Enormous sums pile up with almost incredible swiftness; in the quick whirr of its work a million-a-minute appears to be the pace. It therefore never occurs to the average person whose views we are taking, for the moment, to apply to steel the same conventional economic standards that he would apply to cotton or shoes or lumber. Dazzled by the lure of its millions and by the familiar tales of its autocrats, he cannot believe that anywhere in the industry is there room for those financial heart-aches that beset every other calling. He cannot conceive that up and down the whole business, a far-flung rank and file—machinery manufacturer, founder, furnace operator and all the rest of their colleagues—wrestle with the pressing problems of capital and credit and all those other anxieties that are the natural heritage of industrial and commercial pursuit. But they are there, nevertheless.



PAUL M. WARBURG, OF THE FEDERAL RESERVE BOARD, HURRYING FROM THE CAPITOL

Now at the root of nearly all the trouble in this world you are apt to find money, or more often the lack of it. And so it is with iron and steel. The problems of its financing, as represented, for example, by the harsh and inflexible ore contract, yield to no other enterprise in rigidity and scope. Incidentally they present a few complications that are peculiar and distinct.

During these past 12 months that have registered their advance in the terms of a year fateful in history, there have been, and still obtain, crises in iron and steel to test the soul, try the resource and almost menace the integrity of this supreme American industry whose growth has quickened the pride of all our people. We have witnessed a tremendous shrinkage in the volume of business; an almost unprecedented decline in price; a period of disorganization that often trembled on the verge of widespread disaster. Mills have been shut down; furnaces are cold; hundreds of thousands of men have been and still are idle. Uncertainty has crowded fast upon all of this inactivity and the net result is that iron and steel is going through an ordeal that leaves economic scars, bruised bank accounts and a fervent hope everywhere in the trade that the like of it may be long deferred or never happen again. Particularly has the hardship of the past year been visited upon the



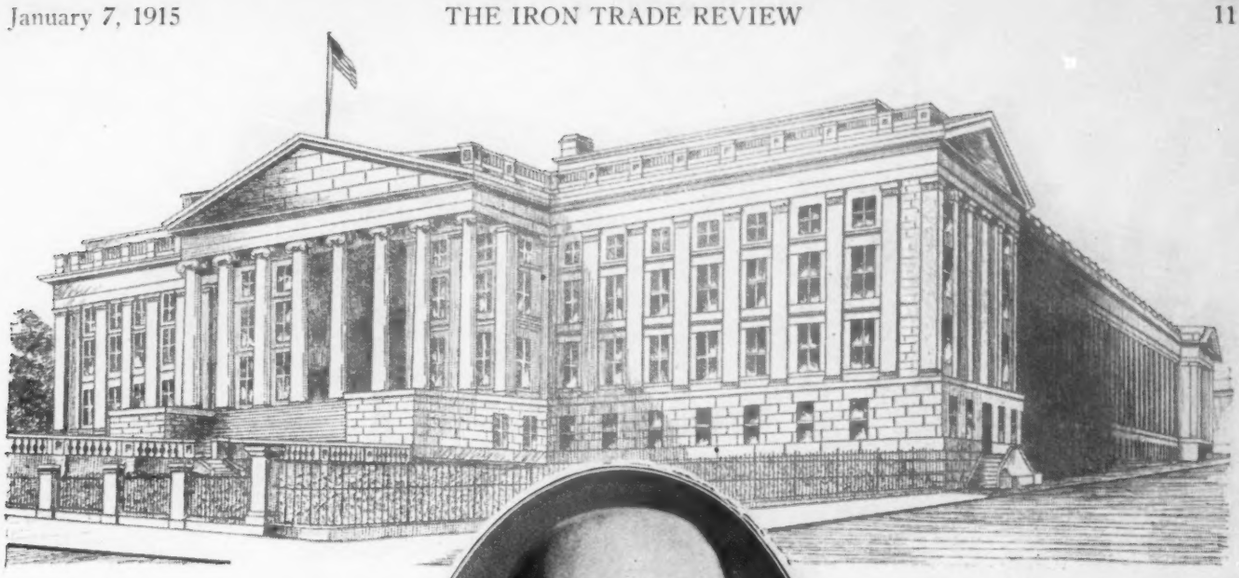
CHARLES S. HAMLIN,
Governor, Federal Reserve Board

small men of the business, upon those absolutely indispensable links between the producer and the consumer. Forced to pay cash for his raw materials at a time when pressure was hard, many of them have literally led an industrial hand-to-mouth existence. Nor has the pinch played any favorites. Depression is no respecter of persons, and your huge, myriad-furnaced plant has had a community of travail with the small-town foundryman. Money has been scarce and business scarcer. The first to feel the effect of hard times and the first to respond to them, iron and steel—which is either "prince or pauper"—has been caught between the two traditional millstones. Yet "amid the encircling gloom" that has invested the business like a pall, there now shines at this glad dawn of a new year of industrial aspiration, one beneficent ray of light to comfort the steel maker and bring perhaps a thrill of hope to the trade in general. It lies in the intelligent and widespread employment of one function of the new federal reserve banking system which, in a figurative sense, may be regarded as the Messiah of the nation's business because it means deliverance from antiquated and panic-breeding methods of financing. Indeed, not only iron and steel, but all constructive endeavor stand at the threshold of an opportunity which should create a whole new era of prosperity.

But before we go into any interpretation of the significance that this new banking system bears to iron and steel, let us first take stock of the situation that obtained before the day-break. Why has the path of the industry been so beset with peril; so fraught with hardship all along the line?

There are two fundamental causes. One of them has been purely physical; the other, more or less psychological. The first, of course, is quite obvious. When you practically take away from any business its principal customer, you need no diagram to discover why that business slumps. But this is precisely what happened in the iron and steel industry. The railroads are one of your biggest customers, purchasing more than 40 per cent of the output. Yet what has been the experience of the railroads? Buffeted from partisan pillar to prejudiced post; made the butt of narrow censure and demagogic attack, these greatest, perhaps, of all public servants have been whittled down well-nigh to economic extinction. Full brother to the corporation in being sacrificed on the altar of political usage, they have seen their opportunity for income dwindle while their hope of increased revenue has steadily faded away. Renewal of equipment has become a luxury; existence has been eked out at the expense of comfort and efficiency and almost at the price of safety. No business anywhere has been called upon to endure the injustice that has been heaped upon the American railroad. It is the only enterprise in the world in which the men who conduct it have no censorship of income and where the public dictates the expense. It has been forced to stand supine and helpless while overhead has increased, the cost of labor expanded and red-tape and regulation tied it hand and foot. Where formerly the systems bought in terms of thousands of tons, they now consider themselves lucky to be on the market for units of hundreds of tons. Were the real plight of the railroads presented starkly and frankly, it would arouse dismay, apprehension—even panic. Here then you have the basic reason for the distress in steel.

The second reason for the crisis in the industry may also be laid at the door of administrative power. It lies in the uncertainty that the governmental attitude toward all big business has begot. With the finger



F. A. DELANO,
Vice Governor, Federal Reserve Board

of suspicion pointed at ambitious industrial and commercial enterprise; with high-sounding programs of restriction agitating the public mind and disturbing that most timid of all institutions, which is capital, it is natural that initiative should be stifled and activity paralyzed. Nor have the personal and private lives of our field marshals of trade been immune. Slurs and scars have been heaped upon the men whom other countries would have knighted and spread with the highest honors for their conspicuous service to the uplift of humanity. Legitimate expansion, of necessity, has taken refuge behind a conservative process of "watchful waiting". Such waiting is poison to business, for it means inertia, lack of movement, and in the end, a dismal stagnation. There is nothing new about these revelations, but they are part and parcel of this narrative.

Then, too, there have been contributory causes from within. No one in the iron and steel trade will deny that there has been unnecessary expansion in some directions. In some respects the case of the automobile business was paralleled. When the country first went motor-mad, the industry flared with a tumult of a mining camp. It was looked upon as a big bonanza in which everybody could get rich. Many mistook the hectic rush of today for the legitimate demand of tomorrow. They began to build new factories over-night and rushed capacity to the limit. In short, they pyramided on prospects of prosperity. But the business became standardized, the water, so to speak, was squeezed out, and then vacant manufacturing space yawned.

In a less spectacular and smaller way, this same thing has happened in iron and steel. Capacity was expanded only to find that the demand for product was absent.

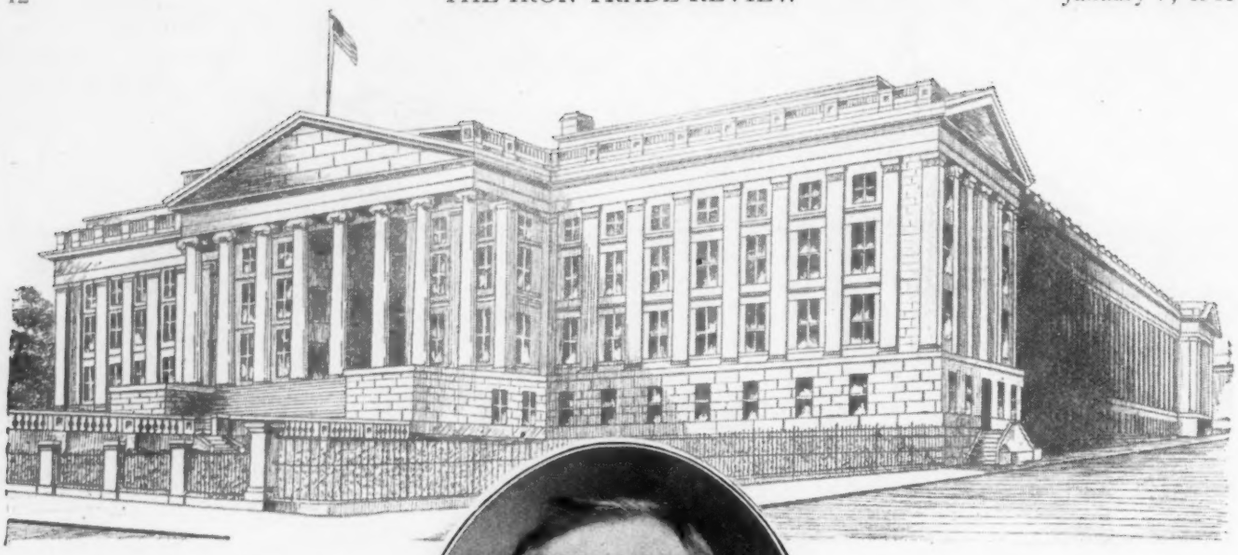
All the while the country still trembled under the shock of 1907 for the wounds of panic are deep. Confidence, like its temperamental mate, capital, preferred the seclusion of inactivity to a publicity that only met rebuff. Events like the inquisition of the Steel Corporation, and the ironic contrast presented by the world's greatest coast-line without an adequate merchant marine, played their part in the drama of hindrance. And then swift on the very heels of this tragedy of unrest came a great world war; a hideous cataclysm that upset credits and started a remaking of the universal trade map. While in one way this ill-wind may blow the steel trade good, as has already been evidenced by rush orders from the belligerent countries, the bigger and more far-reaching fact is that the nervous system of the whole business structure has received a terrific jolt, and jolts of this kind are very costly.

Here, then, you have a blunt summary of the reasons why the iron and steel business of 1914 registered a streak of indigo in the diagram of industry.

Now what was iron and steel doing to perpetuate and protect itself? To get the answer you must examine into its process of doing business.

What first strikes the layman who starts out to investigate the finance of iron and steel is the fact that it is practically on a cash basis. Where the basis is not actually cash or on terms that in other activities would amount to cash, it is very short credit.

Almost from the moment that the ore is taken from the bosom of its mother earth and along the whole line of its clanging transformation into the tools and instruments of man's progress, financial accommodation is a rare commodity. From the ore docks of the north, through varied channels to the inland seas and then on to yard and furnace, its receipt is acknowledged by a series of rigid promises to pay that must be met regardless of wind, weather, condition of busi-



JOHN SKELTON WILLIAMS,
Comptroller of the Currency

ness or ability to pay. There is an endless chain of short credit. When one link in this chain snaps or slips a cog there is congestion everywhere. Instead of a legitimate and expansive credit, the dollar is called upon to work over-time and turn handsprings every few minutes to satisfy the harsh and insatiate demands of the business. At the top of the business scale where there are huge responsibilities there is hardship, and away down that scale in the small foundry, where capital is scarce and where material must be bought in small quantities, real pressure is wrought. The little fellow—the retailer, so to speak—has scarcely any financial elbow room and the moment depression comes along his distress is acute and, strange as it may seem, there has been no aid for him. He must make sacrifices or he must shut down. In brief, there has been in the past no automatic system by which he could get relief.

All this is because iron and steel was financed under a close-knit process in which commercial paper has had little part. By commercial paper I mean those elastic instruments that have annihilated all distance and linked the markets and the merchandizing of the world together.

Thanks to the federal reserve system, however, commercial paper in the United States has had a rebirth; come into a new distinction. It can now be invested with an elasticity and a working power that should be brought to the legitimate and intelligent aid of every business. In times of ease it can permit the trade-craft to rest easily on the top wave of prosperity; when strain and depression arrive, it can be an anchor in the teeth of the gale. There are many men both in and outside the steel business who are inclined to believe that it offers the one antidote against the ills that the hard-and-fast system of financing in the industry has provoked. Before we try to find out just what this rebirth of commercial paper means to iron and steel, it may be well to see, in an elemental way, just what commercial paper is. Every man, no matter what his business is, will be called upon from now on to make some sort of interpretation of this newest aid to our commerce. Fundamentally, commercial paper is the I. O. U. of an individual or a corporation. It is a promise to pay for merchandise bought or money borrowed. It may have one or two signatures at the start. Our modern banking system has been likened to a huge skyscraper reared on a foundation of gold. The main tenants of this imposing structure are bank notes, bank deposits and checks. There are many sub-tenants in this building and the most important one is commercial paper.

Up to the time of the federal reserve act, most of our commercial paper was in the form of the old-fashioned promissory note. It was nothing more than an evidence of an individual loan, practically a personal matter between banker and client. Likewise it was a dead piece of paper that did no service in the work of the outside business world. Until paid or renewed, it remained idly in the portfolio of the bank. In the language of war, it was a solitary soldier of trade standing alone with no aid from any of its kindred. Save in isolated cases of paper bearing the name of men like John Wanamaker, it was seldom traded in.

But take that same promissory note which remained dead and lifeless in the banker's portfolio, and make it part of the European system (and now happily part of the system which now prevails in the United States), and it immediately becomes a live aid and asset of commerce. This is accomplished through an endorsement on the back of it by the banker or an

WILLIAM G. McADOO,
Secretary of the Treasury

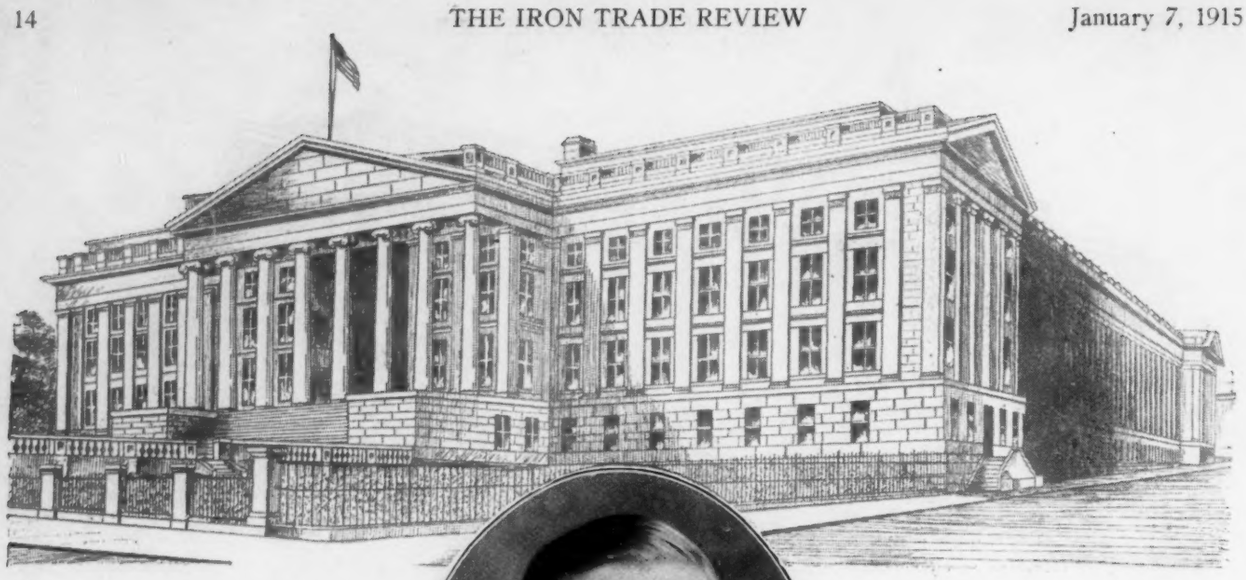
acceptance on the face of it. It then becomes a bill of exchange. What was an immovable investment is immediately converted into a quick, liquid property. Such documents can be mobilized into an army of credit aiding the banker and the individual, giving impetus and inspiration to the business of the nation, and carrying with it possibilities of foreign commerce that will give us a definite place on the world trade map. One of the chief privileges of this elastic commercial paper is that it can pass from hand to hand, from bank to bank. With each change it carries a new endorsement. The more endorsements it carries the greater becomes its integrity; the less become the chances of default.

By such a system which, as most people know, has been in vogue in Europe for many years, the banks do not need idle hoards of cash reserves but live reserves of liquid credit, each piece representing a definite business action whether it is the conversion of ore into iron or cotton into goods. It operates for rich and poor alike; for the immense producer of world output or for the small founder or tradesman.

Europe has escaped periodic depressions because she has just such a system of elastic commercial paper. It created the international medium of exchange that made the whole world a market for European products. It can do the same for us.

One reason why we have had such a scarcity of any kind of commercial paper is a lack of familiarity with the opportunity. Many staid and stable old business houses have a prejudice against it. They think it is an aspersion on their credit. The average man has looked upon the promissory note as the badge of trouble, like the mortgage in the old-fashioned melodrama. Girded up with the new life and power, it may become the symbol of commercial expansion—a very useful member of financial society. Now we can proceed to an examination of the kind of commercial paper available under the new law. Stripped down to its simplest terms, it comprises notes, drafts or bills of exchange employed in commercial, agricultural and industrial transactions. They may be discounted and rediscounted in turn. Double-name paper drawn on a purchaser by a seller against an actual sale of goods constitutes evidence of the character of the transaction. This is the type of the English acceptance which has been one of the iron-clad details of English business for decades. This sort of paper is a biography of the deal involved. It practically writes its own story. Thus it is both history and credit. In the case of one-name paper, the banker discounting it must know the character of the negotiation. No commercial paper is eligible for discount when the proceeds are devoted to permanent investment. This makes the legitimate use of the paper part of the machinery of going, growing business.

Summed up, what does this new system concretely do? It creates a whole new credit system. A man, for instance, who buys a bill of goods on 90 days' time can accept the obligation by endorsing it "Accepted". The seller can discount it at his bank. This bank, in turn, if it needs credit or notes, can rediscount it at the federal reserve bank of its district and get circulation on it. Heretofore banks could only get circulation (bank notes) against the security of government bonds, which tied up huge sums of money in a very unproductive way. In times of panic, this old system caused costly and destructive contraction. The new law not only establishes a credit autonomy but provides a springy currency that can rise and fall with the tides of trade. It places credit at the disposal of every one who is entitled to it and such procedure



ADOLPH C. MILLER,
Member, Federal Reserve Board

ranks with the process of making two blades of grass grow where only one grew before, in its effect on our general welfare. How can this system be applied to iron and steel? you may ask. There are many ways, of course. The chief general function that it can perform is to bring elasticity where now rigidity rules. Take, for example, the case of pig iron. A suggestion has been made and considerably discussed which would create a sort of credit revolution. It is to make all contracts for the sale of the product on an agreed time payment, so that when bills of lading and invoices are sent, they may be accompanied by an acceptance. This acceptance, like the English document of the same name, is nothing more than a time draft. The buyer will agree in advance on the time and place of payment. It is like a check dated ahead.

As I have heretofore explained, the seller (in this case the furnace operator), can immediately discount this acceptance at his bank and that bank, in turn, can re-discount it at the federal reserve bank. Passing from hand to hand, it can only gain in stability and character. The giver of the paper is not apt to side-step his obligation in the face of such movement. Instead of establishing a free and easy credit, such a system puts a check on indiscriminate buying because the purchaser, no matter what his business is, cannot afford to go on record with obligations that he cannot meet. There is too much publicity attached to a shortcoming.

Applied to iron and steel, such a process would loosen an immense amount of capital and would help to make one dollar do the work of two or three. But it can only be achieved in pig iron through complete standardization and by being lived up to by every one in the trade.

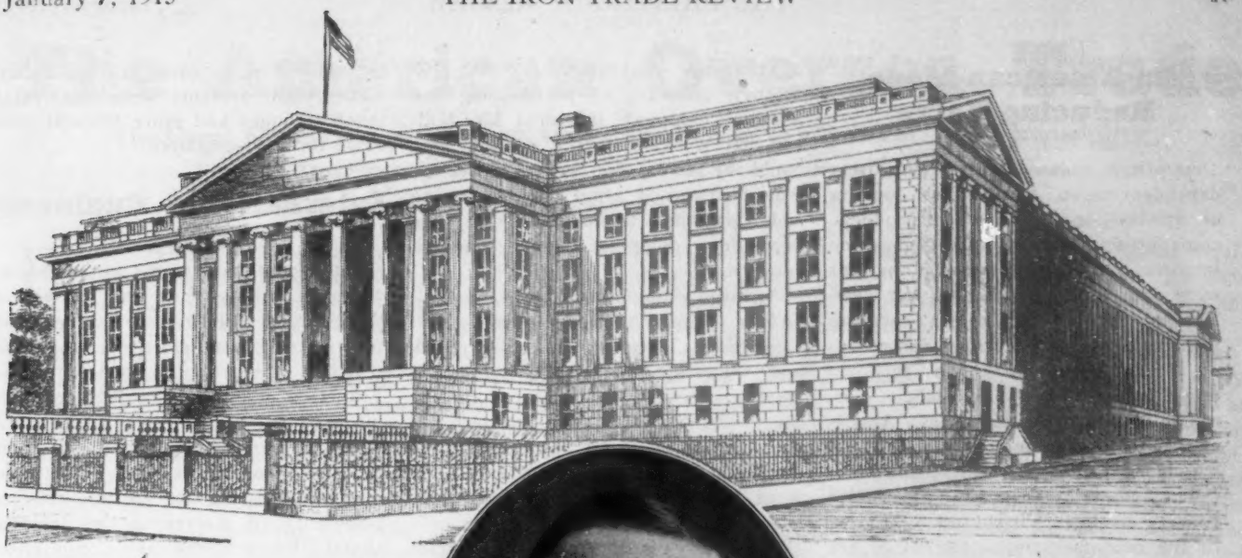
It has even a larger purpose when properly developed. What it could do in the sale of pig iron it could also do for the transactions above and below the pig iron stage of the business. Here is the way it would work. The foundryman who gives his acceptance to the furnace operator can in turn receive one from his customer, an agricultural implement manufacturer, for instance. On the other hand, the furnace operator can buy his ore on the same terms by giving an acceptance or paying with the acceptances that he has accumulated. Thus a new endless chain of credit is built up. But instead of being anchored down by the old rigid short-term rules, it provides a series of elastic bonds of business that work no hardship; and are absolutely automatic. Everybody concerned is helped; nobody is pinched or distressed.

This plan, I might say, is well within the scope of the federal reserve act. Indeed, I broached it to one of the leading members of the board at Washington and he declared that it was logical and practical. He added, however, that the merchant or buyer generally, who indulged himself in the two-name acceptance could not use his one-name credit at the same time. But who wants to cling to the old order when the new is more elastic and certainly more efficient?

Those who have studied this acceptance plan see in it the sure salvation of the small manufacturer and the small tradesman generally. France presents a remarkable example of this efficacy.

In Paris you can encounter on the highways any day various uniformed officials who have cockades in their hats and who wear leather bags slung over their shoulders. They are the runners of the great Bank of France collecting the 60 or 90-day acceptances of Jean and Francois and Hugo, the little business men all over the metropolis.

Take the concrete case of Jean. He runs a small



W. P. G. HARDING,
Member, Federal Reserve Board

machine shop and he wants 500 francs worth of steel bars. He gives his 90-day acceptance to the warehouse and gets his bars. The warehouse discounts the paper with its bank, which may be the Credit Lyonnais. The last named institution may keep it until a few days before maturity or even a shorter period and rediscount it with the Bank of France, which acts as a collector. Jean, you may be sure, has his 500 francs ready to meet the obligation. It is a matter of honor with him to pay such papers; it is part of the tradition of business. And this tradition is like a habit which may be easily acquired. Now let us see just what has been achieved by this apparently slight transaction. A small and worthy factor has been enabled to continue his activities; he has not been pushed or crowded; two perfectly good and big banks have had, as a result of it, an excellent piece of negotiable paper which, trivial as it was, represented a live asset for them.

It is easy to see why and how this system of first aid for the small business man is operative in France. It is part of the custom of the country. Over here we have been accustomed to doing business in a different way. The big buyer goes to his bank, borrows money on his note and then goes out and buys for cash in the open market, getting the benefit of discount or a shade in price. But the little fellow cannot always do that. He must, for one thing, plunge into book credit, which has brought more than one man to his ruin. As a rule, nothing is easier to enter than book credit; nothing more difficult to shake off. It often becomes a personal matter and the personal element, injected into business, is usually expensive.

But with the acceptance plan in wide operation (and it can only be the result of a campaign of education) sentiment will be removed and only actual demand and supply, without hardship, will be the rule. No one is so foolish as to assume that this new elastic employment of commercial paper will bring about an easy avenue to credit where heretofore cash has been exacted. The railroads, for instance, will not be able to share in this new dispensation in their purchasing. But it can bring the dawn of a new era of credit to legitimate business that will inevitably achieve a more widening prosperity. Credit is the very vital air of commerce; the breath of business; the life blood of all expansion. I remember hearing the late E. H. Harriman once say that he did not have much use for a man until he owed a lot of money. By owing money he meant the obligations incurred in the upbuilding of some enterprise, whether railroad or industrial plant. He was more willing to lend his aid to the man who had pledged himself for a million than to the man who had not yet proved his right and title to a line of credit. With Harriman and Morgan, as with most of their colleagues of capital, credit spelled character; it meant responsibility; it paved the way to the larger opportunity.

This new financial machine that I have described must not be regarded as the immediate panacea for our commercial ills. All systems are bad when despair and doubt hold sway; the poorest cannot offset a militant prosperity. Elasticity in commercial paper—beneficent as it is—will not restore the iron and steel industry until the business itself revives; until the railroads are restored to their purchasing power.

In the last analysis you will find that the federal reserve act, properly employed, offers opportunity for credit ease to great and small. Farmer and founder may alike come under its constructive wing. It is immunity against panic; it provides insurance against those perils that distort trade and sap confidence.

An American-Made Reducing Valve

By C. F. Williams

American manufacturers who were dependent upon Europe for supplies of finished or semi-finished products, confronted a serious situation when imports from the warring nations were shut off in August of last year. The breakdown of freight carrying facilities made it necessary for scores of domestic industries to turn to other sources for materials. Fortunately, in many instances, American ingenuity responded to the demands of producer and consumer.

The Superior Oxygen Co., 2515 Liberty avenue, Pittsburgh, was one of the manufacturing concerns in the Pittsburgh district which had figured as a buyer in European markets, before the war summarily cut off exports from Germany. The Superior company had been obtaining a high pressure reducing valve from a German manufacturer. No one in this country, it was believed, could make a valve as good as that furnished by German engineers. But Germans no longer were making valves; their brass and copper was going into cannon, shells and ammunition for the army and navy; their machinists and engineers had been called to the firing line; they were not exporting material to this country.

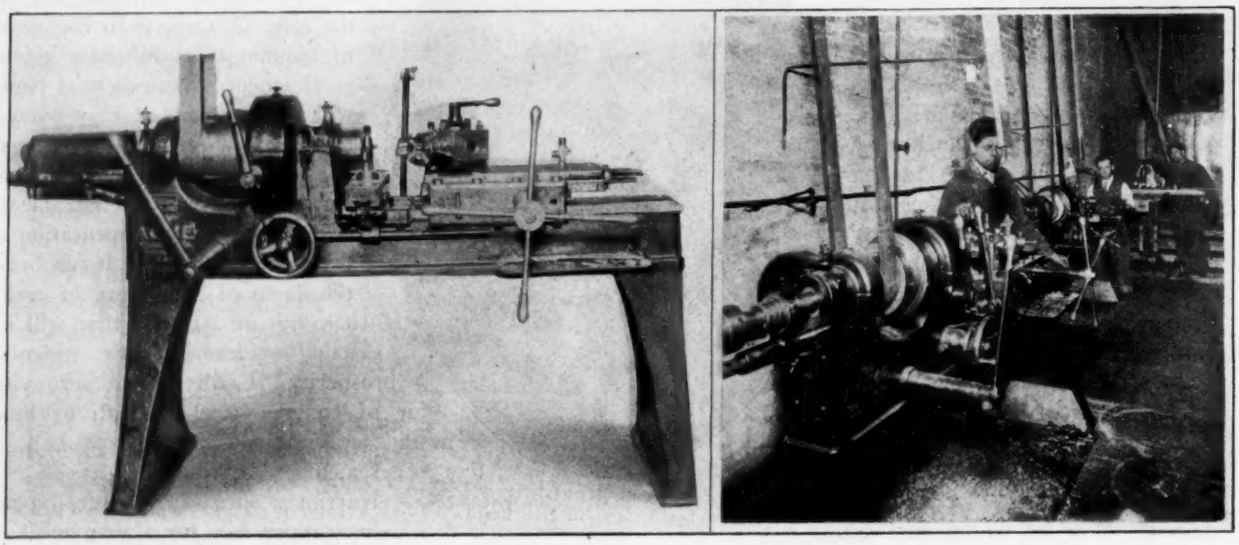
E. G. Muller, general manager of the Superior company, had enough faith in America to welcome an opportunity to patronize domestic industry. He conferred with officers of the Pittsburgh Reinforced Brazing & Machine Co., whose plant is near the Superior company. After a thorough investigation, W. G. Swaney, secretary of the Brazing and Machine company, informed Mr. Muller that a valve of the desired type could be made, by Americans in an American-owned shop. The Brazing and Machine company bought the necessary equipment from American concerns.

A milling machine, lathes, a drill and a grinder were received from Cincinnati, Hartford and Greenfield, and some special turning equipment was purchased. Raw material, in the form of brass bars and bronze castings, obtained from American producers, was unloaded and valves soon were turned out at the rate of 100 a day.

The valve is designed to operate under a pressure varying from 1,800 to 2,600 pounds. Five parts of the valve, including the spring nut, stem, plug, packing nut and safety nut are turned from brass bars, varying from ½-inch to 1⅛-inch in diameter. These parts are made on automatic lathes of modern design. The valve body and the hand wheels are of Tobin bronze. The several parts are machined and assembled, special turning equipment being employed for machining the valve bodies, wheels and bar stock. The valve weighs approximately 18 ounces.

The equipment installed consists of a milling machine built by the Cincinnati Milling Machine Co., Cincinnati; two turret lathes from the Acme Machine Tool Co., Cincinnati; one sensitive speed drill, from the Henry & Wright Mfg. Co., Hartford, Conn., and a grinder furnished by F. E. Wells & Son, Greenfield, Mass.

The Superior Oxygen Co., Mr. Muller says, now is using an American-made high pressure reducing valve much stronger and more efficient than those formerly employed.



TOOLS INSTALLED BY PITTSBURGH REINFORCED BRAZING & MACHINE CO. FOR MAKING REDUCING VALVES

International Engineering Congress

Some confusion seems to have arisen in the minds of at least certain of the engineers of this country between the international electrical congress, which it was proposed to hold in San Francisco in September, 1915, and the international engineering congress, which is to be held during the same month. Owing to the unfortunate situation existing abroad, and the impossibility of convening the International Electrotechnical Commission, under whose authorization the electrical congress was to have been held, it has been decided by the governing body of the American Institute of Electrical Engineers to indefinitely postpone the holding of the electrical congress. This does not affect the international engineering congress, which goes ahead as originally planned.

Marked progress is being made in connection with the latter, and papers have already been received from several of the foreign countries, and everything points to a successful issue. The committee of management of the congress wishes to impress upon all engineers of the country its earnest desire for the support of the whole engineering fraternity.

The average lathe is a fairly accurate tool if it receives half the care it should. The center holes in the spindle require especially good care.

The American Oversea Trade

The Great European Conflict May Arouse the Nation to a Sense of Its Responsibility Toward American Shipping and the Great Need of Practical Legislation

BY RALPH D WILLIAMS

EVERY attempt that has been made hitherto to revive the American merchant marine has resulted in failure. No amount of persuasion or argument could make our legislators see the necessity for a self-contained merchant marine. All pleas have fallen on deaf ears until our merchant marine has sunk so low that only 8 per cent of our foreign commerce is being carried in American bottoms. It has remained for the tremendous struggle now convulsing Europe to awaken us to the great danger of isolation. Not only have we no ships of our own, but the foreign supply has been enormously reduced. Great Britain has withdrawn 500 ships from merchant service for use as naval auxiliaries while over 2,500 German ships are interned at various ports throughout the world. Meanwhile freight rates are soaring skyward, all the profits are going into the pockets of foreigners, and this nation is witnessing the culmination of its policy of shortsightedness. Over 300 American cargoes are awaiting transportation in Atlantic coast ports owing to lack of ships, while those ships flying the flags of neutral countries are being purchased by speculators at most enormous prices.

It is high time that something of a practical character be done. The issue has been thoroughly debated on numerous occasions but nothing has ever found its way upon our statute books for the relief of our merchant marine. There have been all sorts of promises but no performance. Nothing has been put on the statutes since the ocean mail act of 1891 and that act only applied to a single service in the north Atlantic. Pledge after pledge by political parties have either been evaded or deliberately broken. It is time that as a nation of business men we should lift this question out of partisan politics and deal with it solely as a business question affecting our national welfare.

President Roosevelt in his annual message to congress in 1903 stated that a majority of the people desired that steps should be taken in the interests of American shipping so that the country might once more resume its former position in the ocean-carrying trade. Owing to the wide difference of opinion which existed as to the proper method of reaching this end he suggested that a commission be appointed to inquire into the subject. In response to this recommendation Congress passed an act on April 28, 1904, creating a merchant marine commission consisting of five senators and five representatives. This commission toured the entire country, visiting the Pacific coast, the Atlantic seaboard, the Gulf and the Great Lakes, raking the country, as it were, with a fine-tooth comb. No such elaborate inquiry into the state of American shipping was held before and it is not likely that a similar one will be undertaken for many years.

A very large portion of the hundreds of witnesses who appeared before the commission were men who had not a dollar's worth of actual interest in ships or shipbuilding but were manufacturers, merchants and bankers who felt the need of developing new and wider markets and who discerned clearly that such markets could not be developed without an adequate merchant marine. The net result of the investigation took the form of a bill to establish mail service to ports that were not directly reached by American ships. These new routes briefly were:

From a port on the Atlantic coast of the United States to Brazil.

From a port on the Atlantic coast of the United States to Uruguay and Argentina.

From a port on the Atlantic coast of the United States to South Africa.

From a port of the United States on the Gulf of Mexico to Brazil.

From a port of the United States on the Gulf of Mexico to Cuba.

From a port of the United States on the Gulf of Mexico to Central America.

From a port of the United States on the Gulf of Mexico to Mexico.

From a port on the Pacific coast of the United States, via Hawaii to Japan, China and the Philippines.

From a port on the Pacific coast of the United States to Mexico, Central America and the Isthmus of Panama.

The vessels were to range from 12 to 16 knots speed, according to the nature of the service that they were required to maintain and definite sums were to be paid annually for fortnightly or monthly service. The maximum annual subvention for the complete service on the ten new routes authorized by the new bill would have amounted to only $2,665,000, whereas the average national expenditure for deepening channels, maintaining lighthouses, etc., amounts to over $50,000,000 annually. In point of fact, up to the close of 1914 the general government has paid out the huge sum of $880,000,000 for the improvement of waterways, which does not include the hundreds of millions spent in constructing the Panama canal. Compared to this prodigality, the sum necessary to establish an adequate merchant marine is a mere pittance.

This bill passed the senate unanimously on Feb. 14, 1906, but was beaten by ten votes in the house, which at that time had a Republican working majority of 112. In the sixtieth congress this bill, known as the Gallinger bill, somewhat shrunken in form, again passed the senate but was beaten in the house committee on post offices and post roads. It is safe to say that had this bill been passed at the time, this country would not today be in a state of wretched unpreparedness to meet the great opportunities now confronting it for the development of new markets and the exploitation of those trade connections which have necessarily been abandoned by the conflicting nations of Europe.

In 1910 the Humphrey bill was submitted in the hope that it would pass because it had been so designed as to meet all possible objections. There was nothing in this measure to which any reasonable person could possibly dissent for it simply authorized the postmaster general under the provisions of the ocean mail act of 1891 to contract with American vessels for the transportation of American mails to South American, Australian and Oriental ports, the cost being specifically limited to the revenue derived by the government under the act. No measure could be more reasonable, for it did not drain the public treasury of a single cent. The cost was to be borne by the service itself. The clearest, most convincing and most persuasive of arguments were brought to bear upon congress to pass the measure; even the danger of a war in Europe was prophetically held up as a reason why congress should begin to help in building up lines of steamships in the foreign trade. But all to no purpose; the measure was defeated.

Since the passage of the ocean mail act of 1891 nothing has been done for our merchant marine; but on the contrary discouragement after discouragement has been met with. When this country annexed the Philippines it was definitely promised that the coastwise laws should be extended to embrace these islands. What happened? They were actually extended but when the time came for them to go into effect their operation was waived for two years. Then it was waived for another

two years and then it was indefinitely waived.

What happened when the Panama canal was completed? First of all, railroad ships were forbidden to go through it, notwithstanding the fact that the railroads were the only ones prepared to build new ships for this service. That act alone cost the shipyards of this country millions of dollars. Then American ships engaged exclusively in coastwise service were exempted from the payment of tolls but before the canal was ready to admit a single ship through it the exemption clause was repealed. Then the Underwood bill was introduced seeking to extend a system of preferential duties to cargoes carried in American bottoms, but this was held to be contrary to law by the attorney general.

The next step was to insert a provision in the Panama canal act of 1912 that ships not over five years old might be purchased by American citizens and given American register for oversea service. Not a single ship was purchased under this act; nor did anyone at all familiar with the situation expect that any would be.

Since the European conflict has broken out the Panama canal act has been amended to admit foreign-built ships regardless of age to American register for service in foreign trade and to authorize the president to waive the provision that the ships should be officered by American citizens holding American government licenses. The president has accordingly waived this provision for a period of seven years, though all officers on board these vessels appointed to fill vacancies after two years shall have elapsed must be American citizens. About eighty-seven vessels have been transferred to American registry under the provisions of this act, but they were already owned by American corporations and do not in any sense of the word whatever increase our actual operations over sea. The ships so transferred are employed exclusively in carrying abroad the products of their owners, notably so in the case of the United States Steel Corporation, the Standard Oil Co. and the United Fruit Co. These ships are not available for the general service of the ordinary exporter and afford no outlet for this country's commerce beyond the activity of their owners. The most that can be said of this measure is that it works a temporary relief.

The latest proposition that has been advanced is a government-owned steamship line. It is beyond belief that this proposition should have been put forward seriously, but apparently it has. This measure is so preposterous as to be an affront to the intelligence of the American people. The proposition briefly is that the government should spend about $25,000,000 to purchase merchant ships and operate them in the foreign field. Instead of building up an American merchant marine that measure would effectually destroy the little we now have. Can any sensible man expect a banker to loan money to a private enterprise in order to enter into competition with the general government? It does not appear as though this measure could have been thought out in any particular by its advocates because the objections to it are so many and formidable. An American ship visiting a foreign port is private property and the inevitable disputes with the port authorities are purely private affairs, but a government-owned ship visiting a foreign port is quite another matter. Any difficulties arising take on at once an international aspect and may lead to serious international complication. The detention and search of such a ship by a belligerent nation would be a mighty serious thing, because the dignity of the United States would be at stake. This measure deserves to be overwhelmingly defeated. Considered from any angle it is bad business. It would lay a palsied hand upon our shipping. Instead of using this $25,000,000 to purchase a lot of old foreign tonnage, the owners of which are doubtless very anxious to sell, why not use it to encourage American steamship companies to project new lines to various quarters of the globe, as outlined in the merchant marine bill that was presented to congress ten years ago? It is safe to say that if any such distribution was made among the various steamship lines, we would have an adequate merchant marine in a very little while and that once having achieved that end, with established lines of commerce, with trade connections fixed, the ships would undoubtedly be able to care for themselves without any aid from the government.

This question of an American merchant marine is a mighty simple one. We have simply got to look facts in the face, that's all. Our fiscal policy has placed an artificial handicap upon shipping and it is practically impossible for the American ship to thrive until that handicap is either removed or compensated for. It is not a fair thing for this country to extend the policy of protection to every one of its industries and deny it to shipping. Secretary Root hit the nail on the head when he said that as long as we had an artificial handicap upon our merchant marine we should relieve it by artificial means. This is a protected country and for that reason it costs more to build a ship in this country than abroad. Under our navigation laws it costs more to operate it after she is built. Ignoring these two essential facts does not cause them to disappear. They still remain. On two ships of equal size, one English and the other American; our method of figuring tonnage will rate the American as the larger and therefore impose upon her a greater burden in tonnage dues and port charges. American vessels of more than 1,000 tons must carry a third mate whether they need him or not, and must have four quartermasters, although English ships carry only two and let seamen stand the other watches. American ships must carry four licensed engineers; most foreign vessels carry only three, the donkeyman standing the other watch. American ships require three watertenders, a rating unknown on foreign vessels, and a large number of ordinary seamen, while there are enormous differences in the wage scale, as witness the comparison between ships of practically equivalent tonnage given in the table on page 19.

Now that our oversea commerce has received such a staggering blow from the European conflict, congress may have the veil torn from its eyes. At any rate, in all parts of the country there is a quickening of interest in this subject. Stevenson Taylor in his address before the annual convention of the Society of Naval Architects and Marine Engineers in New York, Dec. 10, last said:

"The great European war accomplished in one short month what years of debate in and out of congress failed to accomplish. It brought directly to the personal interest of agriculturists and some manufacturers the great need for them of a merchant marine and over-night, almost, there was a great demand for American ships which the futile legislation of years past has failed to provide. So great has this demand been during the past few months that hasty legislation of various kinds has been proposed and some enacted."

Mr. Taylor then refers to the admission of foreign-built ships to American register and adds: "Whether these vessels and others that follow the example will remain under the American flag will naturally depend largely upon the laws which will be enforced when this cruel war is over." Continuing he says:

"The prominent propositions which have yet to be acted upon are the purchase of foreign vessels, some of which are now interned in our own seaports; and the formation of a steamship corporation to operate so-called American ships in the trade of the

world; either scheme to be supported entirely or in a great measure by the United States government.

"The President of the United States in his message to congress just convened says 'to correct the many mistakes by which we have discouraged and all but destroyed the merchant marine of the country, to retrace the steps by which we have, it seems almost deliberately, withdraw our flag from the seas would take a long time and involve many detailed items of legislation.' Also in reference to the pending shipping bill he says: 'In my judgment such legislature is imperatively needed and cannot wisely be postponed. The government must open these gates of trade and open them wide; open them before it is altogether profitable to open them or altogether reasonable to ask private capital to open them at a venture.'

"These words would be very encouraging if they did not indicate government ownership and operation, our experience in which does not make us enthusiastic. Government ownership has not proved better than private enterprise, by any means. Those who have used government owned and controlled telephone and railroad systems abroad know how they compare with these systems in the United States. Now government operation of ships can only be performed with a disregard of original cost and the regular overhead charges which must in any event be met.

"The actual cost of building and operating steamers under the United States laws according to published figures is at least 40 per cent higher than under the English or German flag, and even more under the flags of some other nations, and if the United States government builds the vessels for our merchant marine, it is certain that the specifications and inspection will make the cost much higher. This great difference cannot be met by earnings and of course there will be no profit. The taxpayers will pay the bill, making such expenditures practically a subsidy in disguise.

"There are difficulties in bringing about the re-establishment of a merchant marine so long neglected. The civil war practically destroyed what was then left of American lines to foreign countries, as the capacity of our shipyards was required for naval purposes. At the same time advantage of the change from wood to iron for hulls was taken by those abroad, particularly by English shipbuilders, who made great strides forward. Our own country needed all available capital and still needs more for interior development, so shipbuilding has been abandoned by capital for the more profitable railroad building and manufacturing. All manufacturers have been protected and that protection made the cost of all labor and materials used in the building of ships much greater than the cost abroad.

"Our agriculturists, so many of whom are far from sight of the sea, cared nothing for American ships. They have been content to allow foreigners to carry their goods until the foreigners have gotten so far ahead, they will be difficult to overtake in the race. Our standards of living have been raised for everybody, but particularly for those who work for daily or monthly wages. Mechanics of all classes have received great increases in wages. These changes in fifty years have combined to cause neglect of an American merchant marine.

"A change in our laws, removing some restrictions and regulations would put the operation of our steamships on the same level as those of foreigners; but the political tendencies of recent years, the evident disposition of legislators to enact legislation like that of the LaFollette seamen's bill, which will surely add to the cost of operating vessels already too expensive to compete with foreigners, makes such a change improbable. The free ship proposition so boldly advocated has proved an absolute failure. Not one ship came under our flag under that proposition, until as I have previously pointed out, 87 were driven by the European war to come under its protection. All other suggestions have been from time to time defeated or tabled by congress and for this no one political party can be held responsible.

"Now the fact remains, regardless of those who hold to the contrary, that British supremacy was *started* and has been upheld by subsidies while the United States was busy in other directions and supinely allowed our commerce to be taken over by them and others. The British government has given an example of this by loaning to the Cunard Steamship Co. at 2 per cent interest per annum sufficient money to build the *Lusitania* and *Mauretania*, to hold the supremacy of the passenger trade, and to provide vessels for their naval reserve. Germany in 22 years has made an enormous advance in her merchant marine. That she would do less to accomplish the result than Great Britain is unbelievable. Japan furnishes another distinguished example of what can be done by a government for its merchant marine.

"We must have a merchant marine. We need hardly revert to instances of our deficiency. Our admirable navy, to be compared to the great navies of the world, must have ships to serve as auxiliaries, as tenders and transports, and as schools for mariners.

"Imagine if you can the United Kingdom's situation during the past few months were she not provided with ample ships most skillfully handled; and what would be even now the condition of our own agriculturists and manufacturers were it not for the ships of other nations, mostly British?

"Our agriculturists and manufacturers must have ships to carry their products to foreign markets, ships under the American flag, for it is truly said "Trade Follows the Flag'.

"Why not follow the examples of other nations? We cannot grant subsidies, that word is so objectionable, but we may grant direct aid, based on

Wages on American and Foreign Ships

AMERICAN

S. S. Acapulco, gross tonnage 2572, operating between San Francisco and Panama, total monthly wages account $3,060.

S. S. City of Sydney, gross tonnage 3017, operating between San Francisco and Panama, total monthly wages account $3,230.

S. S. Newport, gross tonnage 2735, operating between San Francisco and Panama, total monthly wages account, $2,905.

S. S. China, gross tonnage 5060, operating between San Francisco and Hong Kong, total monthly wages account, $3,175.52.

S. S. Aztec, gross tonnage 3508, operating between San Francisco and Hong Kong, total monthly wages account, $2,695.

FOREIGN

S. S. Palena (British), gross tonnage 2553, operating between San Francisco and Valparaiso, total monthly wages account, $1,535.56.

S. S. Aconcagua (Chilean) gross tonnage 2761, operating between Valparaiso and Ocos, total monthly wages account, $1,048.88.

S. S. Linari (British), gross tonnage 2647, operating between Valparaiso and Ocos, total monthly wages account, $1,629.08.

S. S. America Maru (Japanese) gross tonnage 6307, operating between San Francisco and Hong Kong, total monthly wages account, $2,709.

S. S. Titania (Norwegian), gross tonnage 3613, operated as a tramp on Pacific ocean, total monthly wages account, $614.12.

S. S. Canterbury (British), gross tonnage 3508, operating between London and Pacific coast, total monthly wages account, $901.01.

S. S. On Sang (British), gross tonnage 2802, tramp between San Francisco and Hong Kong, total monthly wages account $1,054.71.

service, on increased cost of operation due to the high standards set by our own people; the carrying of mails or the need of a naval reserve; by the loan of large sums at low rate of interest; by preferential or differential duties; by a combination of these methods or without any of them but solely for the broader and better reason that our country needs a merchant marine—not any particular section or class—but the *whole* country and all classes, North and South, East and West."

Three presidents in their messages have advocated definite aid to American shipping. President McKinley in his message of Dec. 3, 1900, said:

"Foreign ships should carry the least, not the greatest part of American trade. The remarkable growth of the steel industries, the progress of shipbuilding for the domestic trade and our steadily maintained expenditures for the navy, have created an opportunity to place the United States in the first rank of commercial maritime powers. Besides realizing a proper national aspiration, this will mean the establishment and a healthy growth along our coasts of a distinctive national industry, expanding the field for the profitable employment of labor and capital. It will increase the transportation facilities and reduce freight charges on the vast volume of products brought from the interior to the seaboard for export, and it will strengthen an arm of the national defense upon which the founders of the government and their successors have relied."

President Roosevelt in his message of Dec. 3, 1907, said:

"The time has come, in my judgment, to set to work seriously to make our ocean mail service correspond more closely with our recent commercial and political development. A beginning was made by the ocean mail act of March 31, 1891, but even at that time the act was known to be inadequate in various particulars. Since that time events have moved rapidly in our history. We have acquired Hawaii, the Philippines and lesser islands in the Pacific. We are steadily prosecuting the great work of uniting at the Isthmus the waters of the Atlantic and Pacific. To a greater extent than seemed probable even a dozen years ago, we may look for an American future on the sea worthy of the traditions of the past. As the first step in that direction and the step most feasible at the present time, I recommend the extension of the ocean mail act of 1891. That act has stood some years free from successful criticism of its principle and purpose. It was based upon theories of the obligations of a great maritime nation, undisputed in our land and followed by other nations since the beginning of steam navigation; briefly those theories are that it is the duty of a first-class power so far as practicable to carry its ocean mails under its own flag, that the fast ocean steamships and their crews required for such mail service are valuable auxiliaries to the sea power of a nation."

President Taft in his message of Dec. 6, 1909, said:

"Following the course of my distinguished predecessor, I earnestly recommend to congress the consideration and passage of a ship subsidy bill looking to the establishment of lines between our Atlantic seaboard and the eastern coast of South America, as well as lines from the west coast of the United States to South America, China, Japan and the Philippines. The profits on foreign mails are perhaps a sufficient measure of the expenditures which might first be tentatively applied to this method of inducing American capital to undertake the establishment of American lines of steamships in those directions in which we now feel it most important that we should have means of transportation controlled in the interest of the expansion of our trade. A bill of this character has once passed the house and more than once passed the senate, and I hope that at this session a bill framed on the same lines and with the same purpose may become a law."

It would seem as though a wealth of argument had been submitted to congress upon this subject and the time has now come to act.

A Clearing House for Manufacturers

BY GEORGE H MANLOVE

A REMARKABLE system of matching the plant without a product and the manufacturer without a plant has been undertaken by the Chicago Association of Commerce and during the past few months when industrial plants have been more or less upset by the European war some unusual results have been attained.

In numerous instances the association has had appeals from manufacturers who found the market for their ordinary output was gone and at the same time it has received appeals from others who found that a product on which they depend for the completion of their particular line of manufacture was not obtainable because importations from various countries were more or less cut off. To find someone in this country who could supply the need, thus stimulating business and at the same time continuing a plant in operation has been the object toward which a great deal of labor has been expended with unexpectedly successful results in many cases.

While for the most part these instances have not come within the strict purview of the iron and steel business, the results have assisted the "Made in America" movement to a material extent and have prevented more than a few plants from shutting down because of lack of information which has been supplied through the industrial bureau of the Association of Commerce.

It has been found that manufacturing plants usually possess a great adaptability and can be switched from one line to another at a comparatively small expense and with no difficulties which cannot be overcome by a little persistence.

One remarkable case of such adaptability is that of a locomotive builder in Chicago. His market was practically gone, but he desired to keep his organization intact and his plant running. A man was found who had designs for a motorcycle of a certain type and consultation brought out the fact that the locomotive maker could adapt his plant to turning out the motorcycle and it has been busy on this new product ever since.

In another instance, discovery was made that a Chicago firm was buying large quantities of a wooden grill for hot air registers to be used in place of the metal type to harmonize with hardwood floors. These had been bought from a foreign source, but a woodworking establishment in Chicago whose business had been falling off, was found which was able to turn them out at a profit in competition with the foreign article. This plant has been working on a large contract ever since.

A number of instances where various glass products were bought in foreign countries, particularly Germany, have come to light. The war has cut off the supply. The result of this was

(*Continued on page 97*)

FOR AMERICA FIRST

A Series of Remarkable Communications From the Country's Leading Men of Affairs

What should be done to encourage the establishment of plants in this country for the production of materials that heretofore have been obtained abroad? How can our people be led to consider America first in all their purchasing? Answers to these two questions were requested by The Iron Trade Review from the executives of leading steel companies, the heads of numerous manufacturing establishments, as well as from well known scientists, teachers and men high in the government service. Their replies appear below.

These communications are bristling with ideas and contain many pertinent and interesting suggestions. They all indicate that a careful examination of our national resources and deficiencies would reveal that in many directions we have placed too much reliance on foreign sources in obtaining raw and semi-finished materials for manufacturing purposes. In addition, we have shown a tendency to buy many finished products abroad that could have been purchased to greater advantage at home, with the result that our home producers have been stultified and we now find ourselves totally dependent on Europe for articles we are all but unable to obtain.

What is the remedy?

Many suggestions are offered, but with singular unanimity our contributors voice the need for a scientifically constructed and administered tariff that will afford real protection in the many directions where it is greatly needed. "Take the tariff out of politics," is the demand.

Of no less importance is the necessity for co-operation with business instead of antagonism on the part of our national government. This plea runs throughout the entire series of communications and it is as emphatically expressed by men not actively concerned with business affairs as with those who are seen every day on the firing line.

Four Requisites For Home Production

BY JOHN A TOPPING

Chairman, Republic Iron & Steel Co.

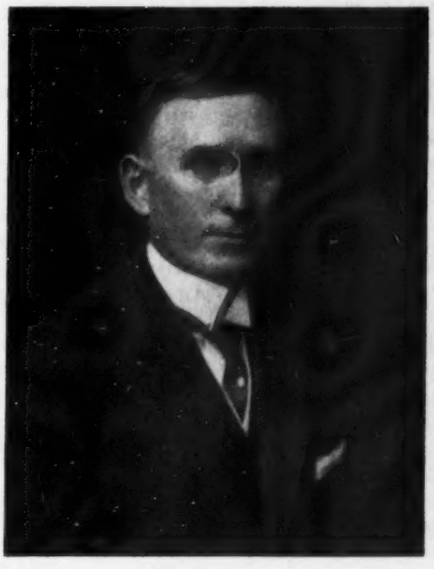
WITH reference to the question, "How, in my estimation, can manufacturers be encouraged to establish plants in this country for the production of materials which have heretofore been imported, and how to encourage buying at home of products that we have been obtaining from abroad", permit me to say, in brief, that the way to encourage the production of anything is to make production profitable, and the way to discourage purchases abroad and stimulate purchases at home, is to make purchases abroad unprofitable and those at home profitable. The specific methods or policy which, in my opinion, should be adopted to influence the results suggested, would be—

First: Adequate tariff protection.

Second: Repeal of Section 3 of House Bill No. 15657, relating to sales regulation of patented machinery and products.

Third: Reforms should be made in patent law practice by establishing higher standards of qualification for practice, together with amendments to the patent laws providing for compulsory working of patents.

Fourth: Administrative reforms should also be made in patent office operations and efforts towards greater efficiency through increased compensation, in order to obtain and hold better ability than is now possible in the administration of the patent office affairs of the country.



JOHN A. TOPPING

As to the first item, it is well understood that capital cannot be induced to embark in any new enterprise on account of the extraordinary hazards involved, unless fully insured against the risks of business not incident to management, or, to put it another way, without a protective tariff to insure the business against unfair competition from abroad, during the experimental stages of organization and operation, and also to provide profit sufficient to properly compensate for the general risks involved. As to the second proposition, capital would naturally hesitate to exploit new methods, processes or machinery, if subject to legal restrictions regulating their right to control either the use or the price of patented processes or devices as without such control profits might not be sufficient to cover properly the usual cost of pioneering or promoting the sale of new articles or devices. Monopoly and high price, thus stimulated, is not an unmixed evil, as such conditions only tend to stimulate research and inventive talent to supply a substitute, so that ultimately, competition protects the public.

As to the third and fourth propositions, it is a well-known fact that many patents are issued where the title is impossible to defend, due largely to unskilled preparation of the specifications and claims, or to careless and unskilled prosecution

of the application to the patent office, and proper skill can only be attracted by better compensation, so that if inventors are to be properly protected, the employment of better skill, both within and without the patent office, would certainly tend to minimize the chances of infringement and to lessen litigation, all of which should tend to stimulate inventive skill and create a condition of greater confidence for the investment of capital, for the development of new processes and devices.

Amendments also should be made to our existing laws to provide for compulsory working of patents within a reasonable time, in accordance with the general provision of foreign patent laws, which would tend to stimulate new industry here, whereas the existing laws tend to stimulate working operations on patents issued to Americans in foreign fields, and supplying home demands from these established foreign sources, while the American patents frequently remain dormant for an indefinite period.

As to the question of stimulating purchases at home, I think it will be conceded that buyers of any product would prefer a home supply, for obvious reasons, and only go abroad when it is profitable to do so, so that this question will settle itself through competitive influences and does not seem to me to call for consideration.

Dr. Whitaker, of Columbia College, in a recent article, expressed himself as believing that American manufacturers lacked confidence in chemists and attributes our present inability to supply certain articles to lack of co-operation between our manufacturers and scientists.

In my opinion, absence of governmental co-operation and confidence, and the presence of governmental antagonism, interference and distrust, rather than lack of co-operation with scientific specialists, is more largely responsible for the disappointing showing made in recent years towards a more self-contained position which we should maintain as a manufacturing nation, and, furthermore, unless business is assured of governmental and legislative efficiency, personal efficiency on the part of business will not insure a proper growth either in old or new fields of endeavor.

The Whole World Buys In America

AN INTERVIEW WITH WILLIAM C REDFIELD

Secretary of Commerce

MANUFACTURERS in the United States have had new and large markets opened to them as a result of the European war. Literally, the world is playing into their hands—not only across seas and boundary lines, but right here in their own country. All that is necessary is that the American manufacturers have the vision to see and the courage to grasp the opportunities offered.

With emphatic words, William C. Redfield, secretary of commerce, made the foregoing points when he was requested to give his views as to the special significance carried in the subject "Buy it in America". By no means did he confine himself to the added domestic buying, but rather he coupled the domestic and foreign fields and defined the bearing the European war will have upon the industrial markets of this country. It has been inevitable from the beginning of the conflict, he declared, with the industries of the warring countries either stopped entirely or partly, or diverted to other than commercial purposes, that many of the nations of the world must look to this country for goods. For the iron and steel trade he sees splendid opportunities in the immediate future.

"It hardly needs to be said," he stated, "that our industrial outlook is in a stage of rapid transition. There has been in recent years great growth in our exports of manufactures as shown by our shipments abroad of iron and steel products of many kinds, including automobiles, harvesting machinery, and other products. Nevertheless immediate touch with the great buying world abroad has been wanting in a large number of our industries. They have not felt its importance nor grasped its practicability.

"With the war and the consequent temporarily depressing effect upon our industries came also another and to many an unexpected factor. The first result of the war was shock. The second result, unforeseen by many, but just as inevitable was stimulation, and this stimulus we are now feeling increasingly. In the field of war the industrial districts of several countries are occupied as the very place of battle. Such cities as Liege, Roubaix and Lille are not producing. There has come also a partial stoppage in other industries in belligerent lands because of the withdrawal of operatives for battle and because the production which remained was in some measure diverted to the purpose of war. Together with these have come an increased consumption in some lines arising from the destruction and the wear and tear of war. It has been inevitable from the beginning of the contest that under these conditions many of the nations of the world should look to us for goods. Those nations not concerned in the war but which were buying of the belligerents find often they can no longer procure goods where they got them before. The industries of some of the belligerents themselves are either stopped in whole or part or occupied in making supplies for the consumption arising from the war. They themselves to a considerable degree must purchase from others. Hence there has arisen quickly and strenuously the need the world over for buying in America. It is true that 'business as usual' is a current motto in Great Britain and that her industries are doing their utmost, and with marked success, not only to maintain themselves but to increase their trade while the conflict goes on. Still it is perhaps too much to expect that they shall do more than fully hold their own as yet. Even if they should actually gain there will still be a vacancy left by others who are 'hors de combat' industrially for the present.

"The world is turning to us for goods. The substance of the phrase 'Buy it in America' is repeated in every land the wide world over. The Argentine minister of foreign affairs cables the ambassador of Argentina here that American manufactures can take the place left vacant by the withdrawal of European industries from Argentine markets. And Argentine is no exception. It is the case everywhere. One has therefore but to look at the columns of the daily press and at the records of export shipments from many ports to see that the movement of 'Buy it in America' has had large practical effects already. Of this the change from an import merchandise balance in August to an export merchandise excess of $17,000,000 in September was itself an example. This growth, however, has so continued that October showed an export excess of $57,000,000 and November, though a shorter month, with two holidays, exceeded $60,000,000. In this way we shall have

paid in the last three months about $135,000,000 of our foreign obligations in goods and this at a time when our largest export specialty, cotton, was significant by its absence from our foreign shipments.

"But this it not all. Americans who have been buying abroad find also that their supplies from foreign sources are diminished or cut off and they too are forced to buy in America. Here opens a great opportunity for American manufacturers. Some will say, as some have said, that if they should undertake to supply the American demand hitherto met from Europe, the time will come when the war is over when the old source of supply will re-assert itself, and they lack belief in themselves sufficiently to undertake that risk. This ignores, as industrial fear is apt to ignore, essential factors in the situation. Much of Europe is busy destroying alike its industrial equipment and its skilled industrial operatives and in mortgaging its financial future. The men who are dying on the field of battle are the flower of the young men of the combatant nations. Out of any large factory in any one of the warring powers, and particularly those upon the continent where universal conscription is the rule, a large percentage of the operatives have gone or will go to the front, and if the sacrifice continues as it has been going on, a large percentage of them will be wounded and many will be killed. To repeat: Nations recover quickly from war, as history shows, but Europe is destroying as fast as it can and on an unprecedented scale workmen and its industrial equipment and every step in that destruction makes them less able to restore the strength of their competition after the war to the condition where it stood before the war. Furthermore, they are destroying their capital. Some at least of the fighting powers will emerge from battle with less money, fewer skilled workmen, less equipment, less productive capacity all round than they had before.

"The world is playing into the hands of American manufacturers. True, we must in time pay our share of the bill but our ability to pay that share without inconvenience depends much on how well we use the present opportunity. Europe is playing with her utmost skill and force the game of destruction. Will America play with her utmost skill and force the game of construction? If so, she will emerge normally stronger just as the belligerents must emerge normally weaker. 'Buy it in America,' therefore, has a double value now. It means advantage to the buyer and to the maker and has in it a large element of patriotic purpose."

Lets All Pull Together for America

BY THE PRESIDENT OF A LARGE STEEL COMPANY

I AM AT A LOSS to understand why the business world today is not more optimistic. There has not been a time within the last fifty years when all kinds of business ought to feel the effects of upward tendencies as they really should at this very period. There is all of Europe, practically speaking, mixed up in this awful war, and here is this great big country—really nothing the matter with it but a lot of Republican politicians finding fault with the Democratic politicians because they are boosting business conditions. If every man in the United States, the Republicans, Democrats, and so-called Progressives, and any other kind of "isms" that are in existence, would, at this time, all pull for old *America*, in a business way, with only common ordinary sense, we would have the greatest prosperity that any country has ever known.

Every American factory should be running at this time full, night and day; railroads should be opening up new territory and getting ready for millions of emigrants who have already made up their minds to leave Europe as soon as it is possible to do so; there should be in London today 200 or 300 American drummers endeavoring to get a portion of the world's tonnage of all kinds which formerly has been placed through Germany and other European makers.

Just think of it; this country is a country of peace, where all the world can look with thanksgiving that such a great big country is in tranquillity with every other nation. I think it is time that every man who stands in the position of a moulder of public opinion—as daily and weekly papers are—should certainly do only what common sense tells them they should do.

I am candid in saying that the feeling among our own salesmen and our entire organization is that conditions are actually better; buyers are willing to place orders for immediate rollings, giving us their specifications. Of course, the price is not what we would like to see, but we first must get the sentiment, secondly the mills filled up, and after that the price will take care of itself.

Buy Your Ore in America

BY R H SWEETSER

President, Thomas Iron Co.

I CANNOT add anything to what has already been said and published regarding the production of many materials in the United States which previous to the European war were made in Europe, unless it would be to say that I believe the pig iron manufacturers of the eastern states can get more of their ore from New Jersey, New York and Pennsylvania than they have up to this time. This would mean, however, mining on a scale that would reduce the cost of ore put on cars at the mines, and it might call for a re-adjustment of freight rates consistent with the rates on Lake ores in other parts of the country for similar hauls. With the introduction of by-product coke, there should be a more extended use of the by-products in manufacturing the many articles that come from the coal-tar products.

The United States First

By Frank Hitchcock

President, Andrews & Hitchcock Iron Co.

We are always for the United States of America first and we believe that anything that can be bought as cheap in this country as any place else, should be bought here.

Divorce the Tariff From Politics

BY S P BUSH

President, Buckeye Steel Casting Co.

IT IS ALWAYS the case that before anyone is willing to invest any money in an enterprise they must have some confidence in the future; that for effort put forth and money invested there must be an opportunity for a fair reward, probably a somewhat greater reward than accrues from those industries already in existence.

Naturally the tariff must be a very potent influence in encouraging a new industry. It is not doubted in this day that there is a very substantial difference in the level of values between the United States and European countries, and it is not supposable that in starting a new industry, improved or cost reducing methods could at once be developed to overcome the difference in the level of values, so that in a general way there must be a tariff that will protect.

The short cut to a successful start would be in some cases at least, bringing to this country a few already skilled in the art of producing the article desired, and in view of the fact that more industry means more labor, and as immigration is taking place constantly, there can be no reasonable objection to this. As I have said, the tariff must protect for a time at least, and it would seem rather essential that the tariff should be taken out of politics and made a question for experts to deal with. There would have to be some relation between the tariff and the cost of production, and it would be absolutely essential for a suitable government authority to have access to the cost. It would not be objectionable to provide such information if the government is to provide protection.

In this connection I venture the suggestion that with the tariff and an income tax it will be deemed essential in time that determination of costs according to some well defined principles and rules will be a requirement of the federal government, and possibly this will go hand in hand with co-operation on the part of competitors in every industry where competition threatens a fair profit. In order that there may be incomes on which to lay a tax, it is essential that there shall be a profit. If there are no profits there can be no business, and competition is destructive and uneconomic when products are sold at or below cost, or without a fair profit.

A Very Simple Proposition

By William Q. Wales

President, Brown-Wales Co.

OUR impression is that finished products are brought abroad largely on account of the cost. We cannot but believe that preference would be given to home manufacturers except that those goods bought abroad can be imported so much cheaper than they can be made here.

We do not know what the solution is except in the tariff. It seems to us entirely the cost of labor and either that will have to be reduced to meet conditions abroad or else a tariff will have to be put in effect which will warrant paying increased wages here. The writer remembers when tin plate was not manufactured in this country at all, everything used here coming from Wales. Many dealers in that article scouted the idea of manufacturing it in this country, but just as soon as a protective tariff was put on the article there were a number of plants started, and now with a lower protection practically all the tin plate used in this country is made here, and we believe this is the secret of home consumption in other lines. As a rule we cannot afford to pay high wages unless some protection is given to warrant it.

An Adequate Tariff Wanted

By George Mesta

President, Mesta Machine Co.

IN MY OPINION the best way to encourage manufacturers to establish plants in this country for the production of materials that heretofore have been imported into the United States in large quantities is to give them ample tariff protection for a number of years, or, until the business has been well established in this country. The best illustration of this is the tin plate industry in this country. Had it not been for the McKinley tariff law, I believe that we would still be importing most of our tin plate.

Let Us Be Optimists

By A. F. Whiting

Secretary Whiting Foundry Equipment Co.

WE ARE firm believers in your slogan "America First" and of buying in home markets rather than abroad. Particularly is this to be advocated in the face of a hard winter and every indication of suffering by the great mass of our unemployed working men and women. Let us build up our own industries; let us advocate and promote the establishment of new industries for the purpose of supplying the markets of the states with many of the manufactured lines formerly purchased abroad. Let us be optimists, showing in every way our faith in our own country and in our ability to produce good goods at economical prices. The field is open to us and if we all go forth in the spirit of optimism and with the determination to buy American products it will help restore confidence, re-instate the idle workingmen in our factories, giving them the opportunity to earn a wage sufficient for their support, making them independent of charities.

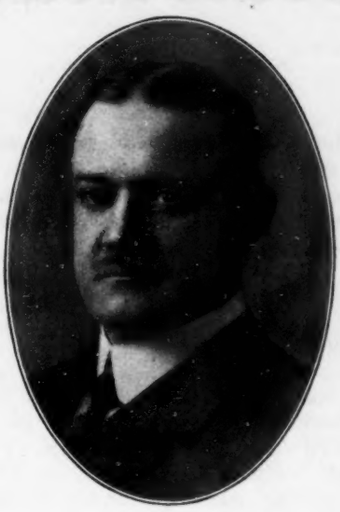
Educate Consumers

By Albert Sauveur

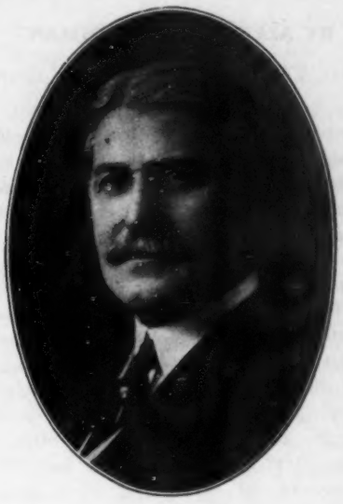
Professor of Metallurgy and Metallography, Harvard University

I HAVE no doubt but that many iron and steel products which in the past have been imported from Europe could be manufactured in this country. It seems to me that the essential point is to convince the consumers that the mark "Made in America" stands for as high quality as "Made in Germany," if not higher. The prevalent belief that foreign-made are necessarily superior to domestic-made articles should be uprooted, as in the majority of cases it is unwarranted.

Not being a manufacturer, I am unable to suggest any plan of action to bring about so desirable a change in the attitude of consumers, a circumstance which I greatly regret.



E. A. S. Clarke



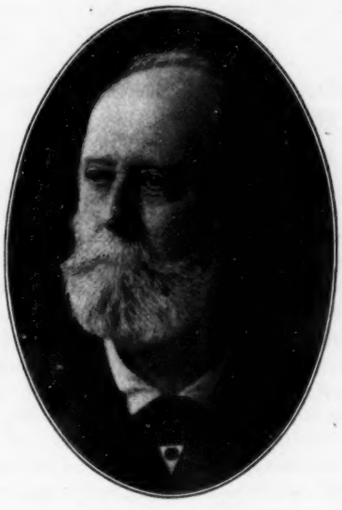
George M. Verity

Robert P. Lamont

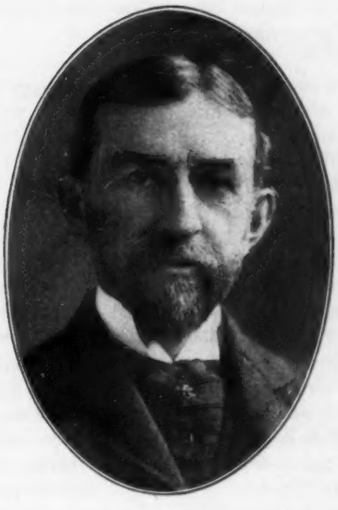
Ralph H. Sweetser

Allerton S. Cushman

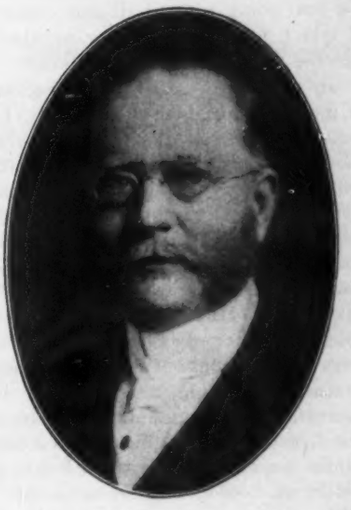
George Mesta



Powell Stackhouse



A. F. Huston



W. C. Redfield

A FEW OF THE MEN WHOSE CONTRIBUTIONS APPEAR ON THE ACCOMPANYING PAGES

Congress Should Offer Some Relief

BY ALLERTON S CUSHMAN

Director, The Institute of Industrial Research

IT IS MY BELIEF that unless congress offers some relief to the present situation, we cannot reasonably expect manufacturers to embark on new enterprises, the future success of which would have to depend upon conditions which cannot now be accurately forecasted. If some amendments to the now existing tariff law of the country could be made, by means of which a dumping clause could be inserted, forbidding foreign manufacturers to sell materials in this country at lower prices than they sell in other countries, a considerable amount of unfair competition would be removed from American enterprises.

It is useless to talk about starting new plants in this country to produce materials that have been heretofore imported, if, either at the present or at some future time, foreign producers are permitted to undersell the domestic article for a price which may be at, or even below, cost. Since we have a law in this country, which is pointed against unfair competition between our own home producers, it is difficult to understand why we should permit the same sort of unfair competition from foreign producers.

I believe that our system of permitting foreigners to take out patents without the necessity of working them in this country does our people great harm. The fact that with certain countries equalizing arrangements have been made does not, in my opinion, operate to our advantage. It is very well known how difficult it is for Americans to obtain just consideration in certain foreign patent offices.

When it comes to the question of attempting to induce manufacturers to establish plants for the production of new materials which heretofore have been imported, I find that capital is very shy, even in the face of figures which show sufficient profits on an ante-bellum basis. Capital immediately points out that the danger of foreign competition and cheap labor is too great, under the present existing laws, to justify any new chemical industries in the United States. In the manufacture of clever and ingenious mechanical devices, we have in the past and will continue in the future to lead the world. I need only to instance such articles as typewriters, cash registers, phonographs, sewing machines, adding machines, etc., etc.

However, it is in the line of chemical industry and chemical engineering that we have been heretofore particularly deficient, and our manufacturers and capitalists need more knowledge of the great value of this particular line of advance before they can be expected to embark upon enterprises in which chemical engineering is the most important consideration. Nevertheless, it is my belief that American capitalists, manufacturers and industrial chemists stand ready to accomplish all that is necessary for our independent production, provided our law-makers see fit to grant a reasonable amount of protection for new-born enterprises.

Aim for Quality Rather Than Quantity

BY R H RICE

General Electric Company

I AM OF THE OPINION that American consumers of material are always desirous of securing material which they need in the United States, and the only reason for going outside of the country is to secure material which for one reason or another our manufacturers are unable or unwilling to produce.

As an example, on a recent occasion requiring some sheet metal of specified elastic limit, I was unable to find any manufacturer in this country who would even consider selling material on any specification of elastic limit, except after a very long and vexatious search, and even then the elastic limit specified was not high enough to serve the purpose in view.

I was aware at the time that such material could be obtained abroad without difficulty. The reason for this state of affairs in America seems to be the focusing of the steel manufacturers on the question of large production. It is, of course, in developing new apparatus, impossible to guarantee large production at the outset, and our manufacturers ought to recognize the desirability of encouraging development by being willing to supply small quantities at a reasonable price, which I should think could be done by proper organization.

There are many disadvantages connected with dealing with foreign concerns in the purchase of material. Not the least of these is the question of delivery. Now that business is dull and factories are empty I find a considerably greater inclination among our manufacturers to consider special requests for new material than has heretofore been the case.

American Made Special Steels Compete Successfully

By George Baker,

General Manager of Sales, Illinois Steel Co.

WITH reference to the importation of special and alloy steels from Europe, for the past two years we have been supplying a considerable tonnage of steel in competition with the imported product, consisting of high carbon, high chrome, high chrome-nickel, chromium, chrome-silico-manganese spring steel and silico-manganese spring steel. All of these alloy steels are made by an electric process and we have been very successful in producing a satisfactory quality.

Our inquiry and production is constantly increasing in these special steels and we believe that a little experience by the manufacturers in this country will enable them to furnish these special steels, both in a quality and price satisfactory to the consumer.

We Need an Honest Tariff Commission

BY C M FENTON

Columbus Iron & Steel Co.

IN MY OPINION five principles are involved to sufficiently encourage American manufacturers to establish plants here to supply the home markets and displace a portion and eventually the most of the $2,000,000,000 worth of imports this nation now buys abroad.

1.—*Protection,* by scientifically administered tariff.

2.—*Confidence,* in future of business and the present administration.

3.—*Harmony,* between labor and capital and a realization on the part of both that each is dependent upon constructive and executive brains.

4.—*Education,* of the people by the press that their best interests are conserved by using exclusively home products and that they travel in and see the United States first.

5.—*Peace.*

Create a non-partisan tariff commission to scientifically adjust the tariff so as to protect sufficiently both labor and capital against foreign competition with power to advance or reduce rates of duty quarterly as conditions arise and business demands. This will create immediately confidence in general business, in the administration and the safety of expansion.

Require all manufacturers to stamp the products "Made in the United States" and properly grade them according to established trade customs.

Make by national law labor organizations financially responsible so their members will be compelled to carry out their contracts just the same as corporations and firms are now compelled to carry out their contracts, or suffer damages; also make the officers and board members of labor organizations criminally liable for the acts of their organization members when they break the laws, as they generally do under the orders of such leaders by destroying property, beating up workmen and frequently committing murder when they refuse to join their organizations.

Education should be undertaken by the press by systematically publishing arguments and thus teaching Americans that it is highly patriotic to use only goods of American manufacture and thus make it quickly fashionable to wear, eat and use only American products, covering the entire schedule of necessities as well as luxuries, and that everything needed in America can be made here as perfectly as elsewhere on the globe; that Americans should first visit and see the leading cities and wonders of our 48 states before they tour Europe, and that no man or woman is loyal or patriotic unless he knows his own country first.

Nowdays people read papers far more than they read books and the press unitedly can aid the people along the Abraham Lincoln way, that dollars spent at home remain here to continually do good, but dollars spent abroad are "kissed goodby" and are rarely seen again. Peace we should have both at home and abroad at any price.

Within a year I had occasion to visit Joplin, Mo., a fine city of 30,000 people, the center of the zinc ore industry of the southwest. I found the business dying and the people dissatisfied and "ag'in the government", because Congress last year had reduced the duty on imported zinc ore from 1c per pound specific duty to 10 per cent according to value. As foreign zinc ores are entered at the various custom houses at $20 per ton, the zinc mines now have $2 protection as against $20 per ton heretofore, and they are unable to compete with South American, Mexican and Spanish mines where labor is about eight to ten times cheaper. In consequence, the mines of Missouri, Arkansas and Kansas were being closed rapidly; 20,000 miners were thrown out of work and business in that district generally demoralized.

It was my privilege last August to go through a number of large pottery plants in Sebring, O. These manufacturers, with the co-operation of the pottery workers' union, had taken "time by the forelock" and had persuaded the Underwood tariff committee to give their industry 40 per cent protective duty after President Wilson had authorized Secretary of Commerce Redfield to investigate six English potteries and compare them with six American potteries. Secretary Redfield set forth the results of his findings in a pamphlet entitled "The Cost of Manufacturing Pottery in England and America."

The potteries were all busy and contented; potteries of the entire country were running from 75 to 80 per cent of normal and making some money, while general business all through Ohio was depressed, and other plants, such as steel mills, wire, tin plate, woolen mills, underwear and other industries were only running from 35 to 40 per cent of normal, and the business that they were doing was on such a close margin that the owners were dissatisfied. The pottery industry is the only one that I know of that was investigated scientifically by the Underwood committee.

I, therefore, conclude that an honest, capable tariff commission could quickly find the cause of our business illness and would have the power to apply the remedy. Let us hope our next Congress will rise above politics and see the right way. It is perfectly plain to some of our citizens but others befog the course with academic arguments. In addition, it is high time some action be taken looking toward an amelioration of present conditions and it should be the duty of every business man to preach the gospel of scientific protection wherever he goes.

American Steel Leads the World

By Bradley Stoughton,

Consulting Engineer

AMONG many of the manufacturers of the United States the custom has been prevalent of buying high grade steels, and especially steels having high tensile strength and also alloy steels, from manufacturers in Germany and England. This is due in part to the survival of the argument, which ought long ago to have died out, that Americans cannot make as high grade steel as foreigners; and in part to indifference of the American steel manufacturers themselves towards the trade in steels of very high grade.

If the curtailment of importation of this high grade and alloy steel will serve to educate American manufacturers to a thorough knowledge of the fact that American steel makers can and will make just as good quality steel as foreigners, we prophesy that the future importations of high grade and special steels will be materially reduced, even after the conclusion of the present disturbed conditions in Europe.

Details as to What We Are Up Against

BY JOSEPH G BUTLER, JR.

Who Needs No Introduction

IT IS NEEDLESS to say that I am very much in favor of having everything made in America that can be so made or produced. I also think that "America First," is a good thing to tie to. The Brier Hill Steel Co. uses the following:

Eighty per cent Ferro-Manganese: We buy both the English and the German make. We would gladly buy this article from domestic sources, if there were any. The Steel Corporation makes its own supply of this material from ores brought from Russia, India and Brazil, and occasionally is on the market with a surplus product. We buy it from abroad, because we cannot find it at home, from a dependable source.

Magnesite: Our material comes from Austria-Hungary, and there is no domestic source of supply for this material. There are considerable deposits of magnesite in California, but the material is really too pure for open-hearth purposes. Magnesite brick are made in this country but from material brought from Austria-Hungary.

Chrome Ore: We use a few tons of this material every month, and our supply comes either from Turkey or from Rhodesia in South Africa. There is no domestic supply that we are aware of. Chrome brick are made in this country, but from material imported from abroad as above.

Fifty per cent Ferro-Silicon: We use a ton or two of this material every month, and our present supplies were shipped from Sweden. There is no domestic source of supply, although the material is made in some quantity at Welland, Ontario. Our last purchases some six months ago came from Sweden, because it was to be had at a price some dollars per ton under the Canadian product. We also use some 10 per cent ferro-silicon, and this of course comes from domestic producers.

Aluminum: We use a ton or two of this material every month and use the domestic material. The shipments come to us from Niagara Falls, New York.

We use no foreign tool steels and never have, buying domestic materials only. Our laboratory, of course, uses certain chemicals which are not produced in this country, and which must be purchased from abroad, also occasional articles of glassware, which are imported from Germany or Austria, and which are supposed to be superior to those of domestic manufacturers. This business only amounts to a few dollars a month. In conclusion, it is needless to say that any article made in The United States of America, will always be given the preference.

The Iron and Steel Industry is Patriotic

BY ROBERT P LAMONT

President, American Steel Foundries

WE IMPORT practically no material except ferro-manganese. The manufacture of this article, of course, depends primarily upon a source of manganese ore, and as long as the most accessible supply of this material for the time being is in Europe, and as long as the material can be produced cheaper there than here, manufacturers will naturally look to Europe for their supplies.

No doubt there are a good many cases of manufacturers buying foreign materials when equally satisfactory materials can be found in this country, but, as a general proposition, I think this is not true in the iron and steel business. Most manufacturers prefer to buy materials in this country, when they can be had of equally good quality for the same price.

Certain materials, however, in the manufacture of which labor is a large percentage of the cost, can be produced more cheaply in Europe than here, and as long as the Democratic party is in charge of the tariff, I see no chance of American manufacturers competing. It is largely a commercial matter. Our people cannot reasonably be expected to pay a higher price for American made articles than for European made articles of the same quality. American manufacturers will not go into lines in which they know they cannot compete with foreign costs.

There is, however, it seems to me, a fertile field for "America First" educational work in the line of cloth fabrics, dress goods, and wearing apparel of various sorts. For some reason or other, many of our people prefer to buy materials of this kind with foreign labels, even where the articles themselves are no better than can be produced at home. So true is this that in many lines it is almost useless to attempt to sell an American made article, and the stock phrases most effective in making sales are, "This is a foreign model", "This is imported material," etc. Our annual imports of articles of this sort run into enormous figures, and anything that can be done to create a sentiment among our people in favor of American made articles of this kind will very materially help our balance of trade and our financial position generally.

Give Us a Scientific Tariff

By Silas J. Llewellyn

President, Interstate Iron & Steel Co.

THE BREAKING out of the European war has certainly been of wonderful educational advantage to the business men of the United States, and it seems to me that you have crystallized into your features the very things that are needed to be particularly developed and worked out. My suggestion as to encouraging our manufacturers to produce goods that have been imported naturally gravitates to the wonderful achievement under the McKinley tin-plate tariff, which in a few short years demonstrated exactly what could be done, and similar protection and encouragement for die stuffs, textiles and in another way for our merchant marine would undoubtedly produce very satisfactory results.

Rather than undertake to develop new factories to manufacture goods that are needed under temporary foreign war conditions, it is better to enlarge our present factories by patronizing to a greater extent American made goods and by giving them preference over imported articles.

Pioneers and Protection Are Needed

BY W S PILLING

Pilling & Crane

I THINK that the difficulty of establishing such plants as you propose will not be due to any lack of enterprise nor ability among American manufacturers, but to the fear or practical certainty that after the close of the European war many such plants would be unable to compete with foreign factories, due to disadvantages in natural conditions and disparity in cost of labor. The most certain way of encouraging the establishment of such plants would be a reasonable tariff to offset the advantages of foreign competitors. It can hardly be supposed that Americans would go to the expense of installing special machinery and processes and building up an organization, all of which would be valueless as soon as imports could be resumed.

My impression is, therefore, that manufacturers will proceed rather slowly under present tariff conditions. No doubt many industries could be built up, just as the tin plate business was built up, by reasonable tariff, and when once established many such enterprises might be successful under reduced or even eliminated tariffs. It is not, of course, possible to place all such projected plans under one classification, as there might be exceptions to the general rule, but in my opinion the tariff situation will be the governing factor to prevent the establishment of many plants which could ultimately produce the desired materials. The pioneers would have to be both patriotic and charitable, and possibly be prepared to lose heavily at the outset.

Colossal Trade Directory Suggested

BY GEORGE F STEEDMAN

Curtis Pneumatic Machinery Co.

I BELIEVE that the proposition you put forth is so big that any results along the suggested line could be reached only through the initiative of the bureau of commerce at Washington. A comprehensive trade directory, or illustrated census of United States manufacturers, divided according to product, issued by the government and distributed broadcast, would, to my mind, be of great value, enabling any purchasing agent to find out quickly and authoritatively, just what company in our country manufactures any article which he may choose to buy.

We feel that in this tremendous country of ours that the first thing one needs is information as to where a certain material or certain product can be bought.

As regards encouraging manufacturers to establish plants in this country for the production of materials that heretofore have been obtained abroad, I think it will be necessary to have some governmental bureau, through which statistics could be obtained in popular, easily understood form, as to what we are buying abroad and who is buying it. In other words, both the question of purchasing American made goods and building American factories for products now imported could be greatly helped by the bureau of commerce in Washington, giving to the average small manufacturer information along these lines, which it is very hard, if not impossible, to obtain today.

I believe it is a well authenticated fact that the German government serves its manufacturers in a similar manner, in many ways, including foreign trade as well as domestic.

We Should Meet on a Common Ground

BY E A S CLARKE

President, Lackawanna Steel Co.

THE SLOGAN "America First" is surely a proper one, and such publications as THE IRON TRADE REVIEW are to be commended for their interest in the subject, and they undoubtedly can do a great deal of good through their advertising and editorial columns.

It is my opinion, however, that the greatest good will be obtained by the individual efforts of manufacturers in seeking out in their legitimate territories customers who have depended upon foreign manufacturers for their supplies of raw, semi-finished or finished goods, and be prepared to spend both time and money (coupled with a world of patience) to furnish not fairly good substitutes but articles quite as good as the customers have been accustomed to receive from foreign manufacturers.

The maximum of success will, in individual cases, be governed by the ability of American manufacturers to obtain specific qualities and quantities of raw materials necessary for the production of special goods, but aside from that feature I believe it is more a question of willingness upon the part of buyer and seller to find a neutral ground upon which to do business.

Statistics Wanted

By Walter Wood

R. D. Wood & Co.

How can manufacturers be encouraged to establish plants in this country to replace articles that have been heretofore imported?

There is no better way to bring such condition about than the steps you are now taking—for the papers not only to start the thought in the community, but at the same time lay before them statistics of those articles, together with their price and probable cost, which have heretofore come from abroad. This last information will be an incentive to ambitious men, starting their minds thinking. Publicity will always bring its own reward.

Reciprocity Necessary to Prosperity

By George M. Verity,

President, American Rolling Mill Co.

TAKING the matter in the abstract, the manufacturers of the United States are now more anxious than ever to do business with all the nations of the world, as we have surplus food stuffs, materials and manufactured products which they need and must have.

There must, however, be more or less reciprocity and we must therefore be prepared to purchase such materials or products abroad as will be helpful to our progress and development.

The European war has shown us more clearly than ever before that there are certain materials that we have heretofore secured very largely from continental Europe which are absolutely necessary to certain lines of manufacture here at home. Wherever possible such materials, manufactured or semi-manufactured products should either be produced at home or secured from countries other than those of continental Europe. In other words, we should plan to make our industrial life absolutely self-dependent and to confine our purchases abroad to such things as can be secured to greater advantage there than at home.

Give Us a Stable Government Policy

By W. T. Hildrup Jr.,

General Manager, Harrisburg Pipe & Pipe Bending Co.

IN A general way I would say that I do not believe American capital can be interested in new lines of domestic manufacture unless capital can be assured of some stability in legislation and a tariff fixed and administered in such a way that the American manufacturer can be protected at least to the extent of his increased labor costs in competition with foreign producers. The administration of a tariff is quite as important as the fixing of rates, as there have been cases in the past where through undervaluations the protection intended by the tariff bills has not been made effective.

The introduction of government regulation of our industries introduces a new element in business methods that will probably have far reaching consequences, and until the results of recent legislation are demonstrated it is not likely that capital will find new ventures, especially in manufacturing lines, attractive.

In my opinion there is no nation or country on the face of the earth that has the possibilities possessed by the United States, but much of our natural advantage may be lost by lack of co-operation between the government, the capitalists and productive labor.

Research Work Advisable

By A. F. Meehan,

Ross-Meehan Foundry Co.

IT SEEMS that while the present European war has greatly hampered the operations of many manufacturers in the United States, it will, at the same time, force upon them many ideas that only necessity may teach. Output and tonnage is the watchword of the great majority. When component parts entering into the manufactured product may be had without trouble, our manufacturers do not concern themselves as to the origin of these parts. But when these parts cannot be had, then the American manufacturer shows at his very best, for his resourcefulness and ingenuity are called upon.

We all know of many instances in this country of research being carried on in almost every line with an idea of producing at home what we have all depended upon getting from Europe. This condition, of necessity, will greatly advance our commercial position and make this country more prosperous and more independent than ever before. Probably we will become large exporters of many materials which have been, up to this time, considered impossible of production in this country, and which might have never been produced here had not the necessity for producing them been forced upon us.

A New Deal at Washington

By A. F. Huston,

President, Lukens Iron & Steel Co.

THERE has not been evidenced any disposition to encourage manufacturers in this country by the present government at Washington. I should say the first important thing to do would be to make an entire change down there and get some public spirited men in that would not only encourage manufacture in this country, but enact laws which would put a merchant marine under the American flag on the high seas. Germany has been a wonderful example of the encouragement of manufacture, but unfortunately at present is jeopardizing it all in this present terrible war.

A New Tariff Policy Needed

By Powell Stackhouse

Director, American Iron & Steel Institute

WITH the tariff policy of the national administration there is no encouragement for American manufacturers to extend their plants for the production of competitive material for export or to replace that imported prior to the existing war in Europe, beyond such outlays for new plant as they can hope to recoup themselves prior to the now uncertain termination of hostilities. There are doubtless minor lines of goods which with the present absence of foreign competition, our manufacturers may be forced to try to supply, and with the knowledge thus gained may become permanently profitable.

How a Political Tariff Cuts

By a Manufacturer of Edged Tools

IT IS an absolute fact that if manufacturers can purchase satisfactory material abroad cheaper than they can at home, it will be done, for the competition is so keen in all lines that advantage is taken of every point to bring down the cost of the finished product. The only way to encourage home industries is to have a tariff that will allow the American manufacturer and purchaser to compete with the foreigner. This runs slightly into politics, but we can see no other way to encourage home trade.

For instance, we manufacture an article which sells, at a very small profit to us, at $1.25. This same article at the present time is shipped into the United States by Germany, or was before the war, and sold in our own state at 40 cents, and the article is fairly satisfactory at that. We, of course, cannot compete against the cheap labor of Germany, and therefore since the tariff has been changed on this article we have discontinued its manufacture. If the tariff was lowered on all the articles which we manufacture in a similar way, we would either have to go into another business or quit. We are hoping that this last election is merely a prelude to what is going to happen a little later, and if it is, we look for a boom in manufacturing.

The War and the Export Trade

Will the Present Conflict Benefit Our Foreign Commerce in Iron and Steel Products or Injure It?

BY C J STARK

WHAT will be the early and the ultimate effects of the great European war upon the foreign iron, steel and machinery commerce of the United States?

Will the breaking down of financial and credit machinery, as the result of the tremendous strain upon the liquid resources of the world have a paralyzing effect upon new enterprises in all countries, so that all markets indefinitely will remain much below normal which will tend to offset the reduced production and trade activity of the great nations now at war?

Will enforced idleness or actual destruction of works and the upsetting of trade relations built up by long and studied effort in times of peace by the great manufacturing countries of Europe, both with one another and with neutral lands, impose eventually an extraordinary demand upon the capacity of the United States to supply the needs of the world, with the result that a radical relignment between buyers and sellers in the markets of both hemispheres will be brought about during the next few years?

An Answer Being Sought

The iron, steel and machinery manufacturers of the United States now are searching for the final answer to these great questions, an answer whose importance to the course of industry of this country during the next few years would appear at this time scarcely to be overestimated. Upon the proper realization of and preparation for whatever opportunity will be created by the vast readjustment of the world's commerce to result from the cataclysmic process now in action, will hang the question whether the United States will take a surmounting position in foreign trade in iron and steel for which its geographical location, industrial development and great resources entitle it logically to occupy.

Today it is pointed out that about 57 per cent of the total iron and steel capacity of the world is represented among the nations actively at war. The United States stands alone as the one large steel power that is not directly involved in the great conflict. The world's output of steel ingots and castings in 1913 was approximately 77,000,000 metric tons. Of this total, the European countries now engaged in war produced about 41,000,000 metric tons, the division being Germany and the independent state of Luxemburg 18,949,929 tons; Great Britain, 7,788,797 tons; France, 4,635,166 tons; Austria-Hungary 2,682,619 tons; Belgium, 2,500,000 tons; Russia, 4,500,000 tons. Adding to the sum of these productions, the 31,300,874 gross tons or approximately 31,800,000 metric tons cast in the United States, it leaves but 4,000,000 tons to the remaining countries of the globe, including Canada, with 1,000,000 tons annually, which virtually is at war and Italy, which finally may be embroiled in the great struggle. Speaking broadly, therefore, the United States is the only portion of the iron and steel producing world today that is able to carry on a normal business.

The production of pig iron and of steel ingots and castings and the total exports of pig iron, rolled iron and steel and miscellaneous iron and steel manufactures in 1913, of the six European countries now at war, given in metric tons, are as follows:

	Pig iron.	Steel.	Exports.
Germany	19,291,920	18,949,929	6,497,262
Great Britain	10,820,381	7,788,797	5,131,733
Belgium	2,527,070	*2,500,000	1,722,308
France	5,311,316	4,635,166	*150,000
Austria-Hungary...	*2,200,000	2,682,619	144,726
Russia	*4,200,000	*4,500,000	.....

*Estimated.

Three of the four great exporting nations of the world in iron and steel now are at war. These, in order of importance, are Germany and Luxemburg, Great Britain and Belgium. The United States is the only other nation of the world that compares in the extent of its foreign commerce in iron and steel with this trio. Germany and Luxemburg, Great Britain and Belgium have been conducting about 80 per cent of the international trade of the world in iron and steel. Today, the trade of Germany and Belgium has been practically suffocated. Great Britain continues to be an active seller in most of the world's markets and she promises to continue so as long as her fleet controls the sea. Under present circumstances, therefore, Great Britain is the chief contender of the United States for supplying the international demand.

The growth of exports of pig iron, rolled products and manufacturers of iron and steel of the four leading countries in this trade during the past ten years is shown in the first part of Table I; in metric tons for Germany and Belgium, in gross tons for Great Britain and chiefly net tons for the United States. A comparison in metric tons of the iron and steel products in principal classes exported by Germany and Luxemburg, Great Britain and Belgium in 1913, classified in accordance with German standards is given in the second part of the table. The exports of finished steel of the three countries further classified and also of cast iron pipe given in metric tons, are shown in the third part of Table I.

It is shown that Germany's principal shipments into the world's markets have been bars, shapes and bands; plates and sheets; rails and wire products; those of Great Britain have been plates and sheets; rails, and bars, shapes and bands; those of Belgium, bars, shapes and bands. Germany's best selling product by far, has been the bar, shape and band class; England's, sheets and plates.

Much Reciprocal Commerce

While Germany, Great Britain and Belgium have been taking care of about four-fifths of the iron and steel needs for which various countries are obliged to draw upon one another, a study of the imports of these three great producers shows that in 1913, their own demands furnished a combined total of 3,946,592 tons of this trade, of which about 3,100,000 tons was carried on among themselves. In other words, about 18 per cent of the world's export business in iron and steel in 1913 was embraced in the reciprocal commerce of Germany, Great Britain and Belgium. In 1913, Great Britain imported from all sources 2,342,709 gross tons of iron and steel, Germany 618,291 metric tons and Belgium 985,602 metric tons. This three-cornered trade among these three countries, at the present time is wiped out. Germany cannot ship to Great Britain; what it might send to Belgium would be small because of the industrial prostration of that country and the further fact that Belgium export trade in finished products, the principal reason for her importations which chiefly are intermediate materials for further manufacture, is destroyed, substantially. Great Britain, though she could ship to Belgium and

Germany, obviously will not do so; in the case of the former, at least, not so long as the Germans hold that country in subjugation.

Germany, because of her leadership as an iron and steel exporting nation and the important position she occupies in the present war, as well as the possibility that the supreme struggle which she now is making will have an important bearing upon her future industrial development, claims first attention in a survey of the world's field of commerce. Germany wrested from Great Britain in 1910, the supremacy in the foreign iron and steel trade of the world; ever since that date, she has increased the spread between her volume and that of her closest rival. Accordingly she has staked the most commercially on the successful issue of the war. The rise of Germany as a world's power in iron and steel, during the past ten years, has been little short of spectacular. That as a nation she has been able to reach a position of production second only to that of the United States, is due primarily to the remarkable expansion of her export trade. Out of a foreign commerce of the world during 1913 in essentially rolled iron and steel products and manufacturers, estimated at 17,000,000 tons, over 38 per cent was captured by the works of the German Empire. In 1904, Germany's exports of iron and steel were 2,770,886 metric tons; in 1913, they were 6,497,262 metric tons. In the same period, Great Britain's foreign trade increased from 3,870,442 to 5,050,919 gross tons and that of the United States from 1,186,349 to 2,759,222 net tons. Since 1906, Belgium has advanced from 1,129,021 to 1,746,821 metric tons.

Table I.

Statistics of Export Trade

Exports of Leading Countries

	Germany.	Great Britain.	Belgium.	United States.
1904	2,770,886	3,426,238	.....	1,167,710
1905	3,349,917	3,870,442	.....	1,010,255
1906	3,651,359	4,859,740	.....	1,325,740
1907	3,432,707	5,311,993	1,129,021	1,301,979
1908	3,735,915	4,299,508	1,064,199	961,242
1909	4,044,391	4,373,381	1,195,885	1,243,567
1910	4,868,385	4,735,734	1,424,918	1,540,895
1911	5,380,964	4,661,330	1,512,613	2,187,724
1912	6,042,023	4,933,112	1,698,340	2,748,466
1913	6,497,262	5,050,919	1,746,821	2,759,222

Iron and Steel Exports of European Countries

	Germany and Luxemburg.	Great Britain.	Belgium.
Pig iron and ferro alloys	856,431	1,142,812	16,760
Scrap	196,408	117,567	152,782
Semi-finished steel	700,779	4,935	152,614
Finished products	3,801,031	2,942,316	1,284,495
Other iron wares	942,613	924,103	139,170
	6,497,262	5,131,733	1,746,821
Machinery	594,317	758,726	
	7,091,579	5,737,041	

Finished Steel Exports of European Countries

	Germany.	Great Britain.	Belgium.
Rails, bars, shapes and bands	500,835	516,911	164,584
Plates and sheets	1,619,486	425,656	649,912
Wire and wire products	664,387	1,556,997	196,223
Tubes	584,873	118,736	54,768
Cast iron pipe	306,455	167,216	6,160
	79,962	239,077	

Germany's principal customers in recent years for finished and semi-finished iron and steel products and ironwares, the latter consisting of chains, screws, rivets, nuts, bolts, tools, castings, cast iron pipe, cutlery, axles, boilers and boiler work and miscellaneous articles, in order of their importance, have been Great Britain, Belgium, Netherlands, Brazil and Argentine, Switzerland, Austria-Hungary, China and Japan, Italy, France, British East India, Denmark, Russia, Spain and the United States. Almost one-half of its export business in 1913, or more than 3,000,000 tons, was with countries with which it now is engaged in war, as an enemy or as an ally. About one-tenth of this total or 331,000 tons, went to its principal ally, Austria-Hungary. The overwhelming balance was with Great Britain, Russia, France, Belgium and Japan.

The interesting question arises will this trade survive the bitter enmities and national animosities growing out of the present war, whatever may be the final effect politically, of the great conflict upon the German Empire. If these trade ties which Germany has built up so efficiently with these countries during the past 10 or 15 years will not be able to withstand the present war, no nation of the earth, probably, is in a better position to bid for a large portion of this trade than the United States. The simple reason for this statement is that an analysis of the relative development of iron and steel manufacture and of the economic potentialities of the various countries, shows that no nation is fitted so well as the United States to compete for the requirements that may be thrown upon the world's market as the result of any such readjustment of commerce. Furthermore, this conclusion is strengthened by the allowance that must be made for both the direct and indirect loss of iron and steel manufacturing property as the result of the present struggle. Imagination requires small stirring to picture the loss from actual destruction of property or from deterioration through enforced idleness to mills and furnaces which probably would accompany an invasion of Germany by its enemies. What might happen to great works particularly those essential to the manufacture of munitions of war, in such an event, can be vividly pictured. Already the world has seen the blighting and destructive effect upon the iron and steel industry of these districts by the flowing of the German armies over Belgium and over the independent duchy of Luxemburg. Are not these same conditions likely to be paralleled in the iron and steel districts of Germany should an invading force reach that territory? A study of Germany's foreign trade shows that her exports in order of tonnage are first bars, hoops, bands, shapes, etc., or merchant products; second, pig iron; third, semi-finished steel; fourth, plates; fifth, wire products; sixth, rails; seventh, beams; eighth, tubes; ninth, fabricated steel. Of the merchant bar, hoops, bands, shapes, etc., classification, the Netherlands has been the largest buyer closely followed by Great Britain, by China and Japan, by Brazil and Argentine and by British East India. Belgium has been the largest buyer of pig iron, though both France and Austria-Hungary have been important customers. Great Britain overwhelmingly is the principal purchaser of semi-finished steel. Netherlands has taken the most plates, with Great Britain a close second. Great Britain also is the largest buyer of wire products. The taking of this material by Brazil and Argentine of Belgium and of China and Japan, has been

(*Continued on page* 90.)

Steel Sellers Holding Firmly

To the 1.10c Quotation on Shapes, Plates and Bars for Delivery Up to April 1—Some Increase in Plant Operations

Railroad buying, so long delayed, so earnestly hoped for and so generally regarded as the absolutely necessary development to insure the return of prosperity, has started in a moderate way and has added to the hopeful feeling which had been growing stronger for several weeks. It is not forgotten that last year opened with a cheerful sentiment prevailing and with considerable buying during the first week, and that hopes were soon blasted, but it is also recalled that the optimism which prevailed at the opening of the year 1912, following the depression and low prices of the greater part of 1911, was justified and that before many months of 1912 had passed a very large volume of business had been placed. The general expectation now is that fair business will be booked during the first quarter.

The next statement of unfilled tonnage of the United States Steel Corporation will show an increase of at least 300,000 tons and it may be considerably more than that. The Corporation is now operating at 40 per cent of capacity against 28 at the close of the year.

In footing up tonnages sold during the year, some of the leading companies have found that the totals of a number of products are as much, or nearly as much, as they were in 1913. Another gratifying fact concerning a year of which little has been said in commendation is that losses due to bankruptcies have not been large and that collections during the past few months have shown decided improvement.

Railroad Buying

A number of railroads have placed orders for rails, but the tonnages have not been large. The Baltimore & Ohio has awarded 4,000 tons and is figuring on about 30,000 tons and the New York Central's inquiry for 40,000 tons, in addition to the 30,000 tons recently purchased, is still pending. The Pere Marquette has purchased 8,000 tons of rails from the Algoma Steel Corporation, Sault Ste. Marie, Ont., at a price lower than the prevailing price in the United States for the same kind of rails. The Pennsylvania is expected to announce its rail requirements soon, but the indications are that its buying will be conservative this year. The Baltimore & Ohio is about to close for 2,000 cars and the Pennsylvania has taken bids on 10,000 tons of steel for 1,000 box cars to be built at Altoona. The Lake Superior & Ishpeming railroad is in the market for 400 50-ton ore cars. The Illinois Central is inquiring for 25 locomotives and the Baldwin Locomotive Works has taken 16 locomotives for a western road. The Pennsylvania railroad will purchase 17,600 tons of riveted steel for bridge work. The Baltimore & Ohio has ordered 25,000 to 30,000 kegs of standard spikes and considerable other business in spikes is pending. Other railroad inquiries include numerous materials.

Pig Iron

In the pig iron market, there is not much activity, but the melt apparently is being well maintained and prices are firmer. In the east, a fair inquiry for basic is pending and a moderate tonnage has been purchased. An unusual inquiry is one from Germany for 1,000 to 2,000 tons of low phosphorus pig iron, and some inquiries have been received from Italy, one being for 10,000 tons. In the Pittsburgh market, Westinghouse companies have sent out inquiries for foundry iron. A good volume of business for prompt delivery has been done in the New York market during the past few days.

Finished Materials

In shapes, plates and bars, manufacturers are making a determined stand to obtain 1.10c, Pittsburgh, for prompt and first quarter delivery. The announcement that this would be the price beginning Jan. 1 has resulted in a considerable volume of specifications coming in and in the Pittsburgh district mills have been able to increase their active capacity to about 50 per cent. Buyers are disposed to question the ability of mills to maintain the 1.10c price, but if railroad buying continues as it promises to do, it will be very difficult to shade the 1.10c quotation. In the Chicago market, steel bars disposed of in December were nearly equal to the combined tonnage of shapes and plates.

THE OPEN HEARTH

The Year and the Outlook

IN REVIEWING the year 1913 in our first issue of 1914, we referred to the fact that several preceding years in the history of the iron trade had been so remarkable that it was difficult to find an adjective which had not been overworked to describe the conditions of 1913. The past year, to a greater extent than any preceding period, has shown the inadequacy of language to meet unprecedented conditions.

The year 1912 marked a wonderful recovery from general demoralization in the industry, and established numerous new records in manufacturing. The year 1913, in spite of the depression that prevailed during a large part of it, made new records for the shipment of ore from the Lake Superior region and the production of pig iron and steel. The past year will, of course, be remembered principally as the year of the beginning of the great war and closely linked with this recollection will be the record of 12 months of profound depression accompanied by greatly reduced production of iron ore, coke and iron and steel products. The decline in prices continued and from a financial standpoint the year was one of the most unprofitable ever recorded.

The most important event of the year 1913 was the enactment of a new tariff law and the trial for a year and three months of this measure has convinced a very large majority of iron and steel manufacturers that its effect has been disastrous, and that results would have been far more demoralizing if the war had not raised a highly protective wall shutting out temporarily, to a very large extent, the competition of European countries. The war has, however, complicated the tariff question as well as many other problems and it would be hazardous to predict what the ultimate effect will be upon legislation in this country. Thorough investigation should be made by a tariff commission.

In a legislative way, the one great achievement for 1914 deserving credit is the enactment of the new banking act, which is so admirably explained by Mr. Marcosson's article in this issue. It has already done much to help straighten out the financial difficulties arising from the war. It promises to do much more.

Owing to the certainty that the war will have tremendous effects upon the industries of this country and the uncertainty as to what the effects will be, one almost feels that in starting the new year he is sailing on an uncharted sea. There are, however, most encouraging indications that at least reasonable prosperity will prevail in the country this year and that in the years to come this great country will be stronger than ever in the family of nations.

Trend of Prices for Twenty Years

THE two charts which are printed on one sheet as a supplement to this issue present a view of 20 years of ups and downs of prices. The figures on which the charts are based are the prices published in the market reports of THE IRON TRADE REVIEW. They are computed for the following: Tank plates, Chicago; beams, Pittsburgh; bar iron, Cleveland; bessemer billets, Pittsburgh; bessemer pig iron, Pittsburgh; No. 2 foundry, Chicago; southern gray forge, Cincinnati; No. 2 foundry, Birmingham; steel bars, Pittsburgh.

In the chart for the past four years, the vertical lines represent weeks, while in the chart covering the 16 preceding years, the vertical lines represent months. In the two charts, the horizontal lines show prices in dollars per net ton in the case of finished material and per gross ton in the case of pig iron and steel billets. The solid and broken lines traversing the diagram indicate changes in prices at which a very large percentage of the tonnage was placed, but do not show the highest or lowest prices at which some tonnages may have been placed. In the case of pig iron, the minimum quotations for prompt delivery are used.

The lower chart shows the very short-lived boom in 1895, which followed the period of depression; then the decline in the latter part of 1895, followed by the slow general decline

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of 1896 and 1897, when in mid-summer the lowest prices on record prevailed; the rather steady trend of prices from the middle of 1897 to the fall of 1898; the rapid rise at the close of 1898, followed by the very high quotations of the boom year, 1899; the sharp decline beginning in September, 1899, and continuing until the mid-summer of 1900; a partial recovery at the close of 1900, and the continuance of prices upward during 1901; the rapid advance during the first half of 1902 and sharp decline beginning in the fall of 1902 and continuing during 1903, followed by a long period of prosperity, with occasional recessions, ending suddenly in October, 1907.

The co-operative policy which prevailed throughout the year 1908 was responsible for more regularity in prices than there would have been without it, but after the declaration of the open market early in 1909, prices declined rapidly. There was a partial recovery during the last half of the year, but the higher prices which prevailed in a number of the earlier years were not reached. The year 1910 was one of declining prices, which started in February and continued until nearly the close of 1911, when the decline in prices was checked and some advances were made. The chart shows the upward trend, which on most products started in June, 1912, on finished materials, and continued through the first four months of 1913. Pig iron started downward very early in the year. Then came a sharp decline, starting May 1, and continuing throughout the year. The past year has been one of weakness in prices, but owing to the low level at the close of 1913, the prices at the close of 1914 did not show much change. In pig iron especially, the chart for 1914 is remarkable in that the lines show smaller fluctuations than in almost any twelvemonth during the 20-year period. An interesting fact is that southern pig iron at the close of 1914 dipped below $10 for the first time since 1904, with the exception of November, 1911, when the average price was $9.75. The $9.50 price of last December is as low as any that has prevailed since July, 1904, when $9.15 was quoted. The lines showing prices of finished materials in 1914 show several unsuccessful attempts to advance.

When one takes into consideration the increased cost of production as compared with earlier years, it is evident that the quotations at the close of 1914 were extremely low.

A Passing Illusion

Editor THE IRON TRADE REVIEW:—

In *Open Hearth*, Dec. 24, headed "Value of Co-Operation", Mr. Whyte offers a clearly expressed thought to students of economics. This thought deals with a definite suggestion which the editor and the readers of THE IRON TRADE REVIEW will find interesting. My contribution will speak of "Co-Operation" in its indefinite form, leaving to others the application of Mr. Whyte's definite suggestion.

Man's life on this planet, looking back, seems brief, as compared with man's life on this planet, looking forward. The boundaries to survive will be the natural boundaries of race and language; the boundaries to die will be the unnatural boundaries built up by hate, revenge and cruelty.

The law of nature is co-operation. The family is an expression of this law. Every divine and human law is symbolized in the home. The town or city is a co-operation of homes; the state is a co-operation of towns and cities; the nation is a co-operation of states; the world is a co-operation of nations; the universe is a co-operation of worlds.

Trade cannot be controlled by force; a dog, a horse, a family, or a nation, cannot be controlled by force; unless by force we mean patience, sympathy and understanding. As passed human slavery, once thought natural; woman's degradation, once thought natural; religious tortures, witchcraft and persecution, once thought natural; brigandage and piracy, once thought natural; so will pass the illusion that co-operation in world-wide peace and in humanity's true advancement, cannot grow in the same soil with trade rivalry and honest struggles for material development.

EDWIN S. JACKMAN.

Chicago, Dec. 30, 1914.
Firth-Sterling Steel Co.,

Year of Low Prices at Chicago

One of Leanest Periods in History of District

Buying Movement Started at the Close of November Was First Encouraging Development—Low Stocks in Hands of Jobbers and Manufacturers—Rail Business Slack

BY GEORGE H MANLOVE

SO MANY conditions of uncertainty have beset the iron and steel market during 1914 that substantial progress from the depressed conditions, which marked the opening of the year, has seemed impossible. When the history of 1913 was written, it was believed the downward sweep of volume and prices had reached the bottom and a recovery must be near. Optimism was felt and expressed and in the opening months this was reflected by a resumption of buying and an upturn in many features.

However, this effort to better things was smothered in actual business conditions. The buying public was not ready to take manufactured products. Railroads refused to begin buying until assured of an enlarged income. Agricultural implement makers had overstocked the previous year and were in a process of liquidation, several narrowly escaping entire ruin.

In March began a downward movement that continued steadily until August, when conditions seemed ripe for resumption of activity and a better condition of the market in general. Just as things appeared propitious for an upward movement that was indicated by somewhat higher prices came the declaration of war in Europe, uncertainty again gripped the business world and buying ceased. Prices held nominally in the face of almost entire absence of buying until September and October, when they began to sag and this condition has continued practically to the close of the year.

Prices at the year's end are the lowest in two years and little expectation is held of better figures for some time to come, as capacity is so large in proportion to probable needs that an immense quantity of buying will be necessary to fill the plants with sufficient orders to give foundation on which to base a higher range of prices.

One factor relied on to assist buying when better demand comes is the fact that stocks in the hands of jobbers and wholesalers, as well as retailers, have been liquidated thoroughly and there are no accumulations to be disposed of before new orders are given. When the demand comes from consumers, it will be reflected at once to the manufacturer, and the middleman will be forced to stock up to take care of the volume of orders.

The innate hopefulness of the American market seldom has been illustrated to better advantage than through the past year. Every factor which promised a better condition of affairs was hailed with gladness only to melt away into nothingness as it developed.

The efforts of eastern railroads to obtain a better basis of rates on freight was relied on to stimulate buying, but the relief granted by the Interstate Commerce Commission in midyear was so slight that it failed to make a ripple on the business sea. The result which might have followed granting of the petition was discounted thoroughly and the actual decision was received without appreciable effect. The larger victory in December served to create better sentiment, but came too late to bring about definite results before the close of the year.

Hunger for business has characterized the entire year and it will be known as one of the leanest in the history of the iron and steel industry. Plants continued in operation at ordinary schedules until past the middle of the year and then began a process of reducing operations to keep pace with declining tonnages.

As the year waned, days and weeks were lost and only careful planning prevented entire closing of many large industries. Operations have been continued on an unremunerative basis to retain organizations and give workers as much opportunity as possible to earn a living from week to week instead of being thrown onto the labor market for long periods.

Only after eleven months had passed did the first glimmer appear of what has seemed to be a real resumption of demand and a better condition of the business world.

At the close of November, a decided movement in pig iron appeared and increased in volume so steadily that it seemed certain that things had scraped bottom and would rebound to higher levels. Coincident with this came a slightly better feeling in finished steel in all markets and the stage now seems set for a revival of interest and a larger volume of trading that will increase the demand and output of mills and stacks. No great increase in prices is looked for and some liquidation in labor costs has been expected for the first half of 1915, in keeping with lower selling

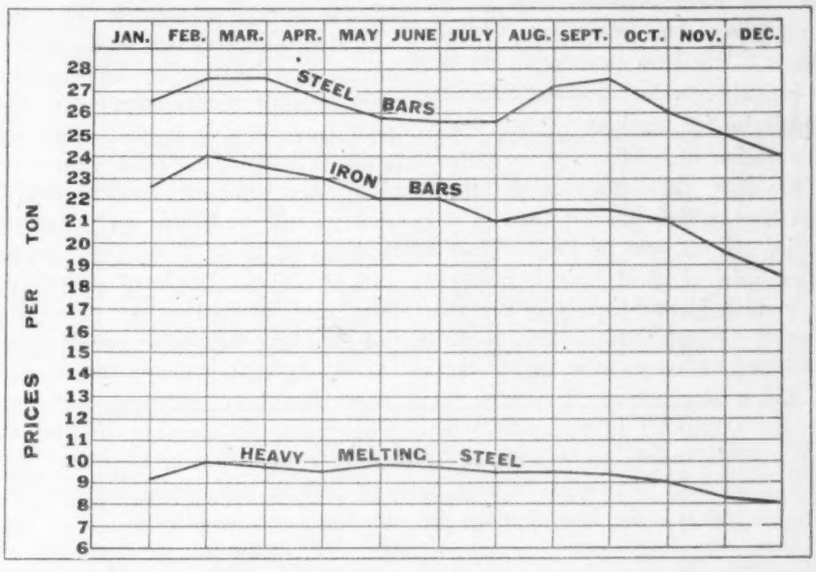
AVERAGE MONTHLY PRICES, CHICAGO MARKET—1914

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Lake Superior charcoal pig iron	$15.50	$15.50	$15.50	$15.50	$15.75	$15.75	$15.75	$15.75	$15.75	$15.75	$15.75	$15.75
Northern No. 2 foundry pig iron	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00
Southern No. 2 foundry pig iron	15.25	14.85	14.85	14.85	14.85	14.85	14.85	14.85	14.60	14.60	14.00	14.00
Bar iron f. o. b. mill	1.13	1.20	1.17	1.15	1.10	1.10	1.05	1.07½	1.07½	1.05	.98	.95
Steel bars, f. o. b. mill	1.33	1.38	1.38	1.33	1.29	1.28	1.28	1.36	1.38	1.30	1.25	1.20
Structurals	1.38	1.38	1.43	1.35	1.29	1.28	1.28	1.36	1.38	1.30	1.25	1.20
Plates	1.33	1.38	1.38	1.32	1.29	1.28	1.28	1.36	1.38	1.30	1.25	1.20
Sheets, No. 28 black, f. o. b. mill	2.08	2.13	2.13	2.08	2.00	1.98	1.98	2.09	2.18	2.13	1.99	1.99
Plain wire, jobbers' carloads	1.53	1.55	1.58	1.58	1.58	1.48	1.48	1.58	1.58	1.49	1.58	1.58
Wire nails, jobbers' carloads	1.73	1.73	1.78	1.78	1.75	1.68	1.68	1.78	1.78	1.83	1.78	1.78
No. 1 R. R. wrought, net ton	8.70	9.44	9.00	8.50	8.63	8.88	9.00	8.75	8.31	7.75	7.50	7.50
Heavy melting steel, gross ton	9.19	10.00	9.81	9.50	9.94	9.75	9.50	9.50	9.37	9.00	8.25	8.25
Rerolling rails, gross ton	11.00	11.19	11.25	11.25	11.25	11.25	11.25	11.25	10.87	10.00	9.50	9.50
Malleable	14.25	14.25	14.25	14.25	14.25	14.25	14.00	14.00	13.50	13.50	13.00	13.00

prices of all products. That no reductions have been made through the trying days of the year just closing reflects the attitude of employers toward workers in the effort to deal fairly and aid in every way.

Pig iron developments are characteristic of the tendency of the market through the year. While prices declined at least $1.50 from the first of the year, this does not represent the situation. Although only 22 stacks of a total of 43 in this territory were active at the opening of the year, production was far in excess of needs, accumulations of iron on furnace yards was too great for comfort and furnace operations were curtailed from time to time until the final month of the year finds only 14 stacks active out of the 43 usually producing iron in Illinois, Indiana, Wisconsin and Minnesota.

Both merchant and steel plant stacks have been affected by this curtailment, only three merchant stacks and 11 steel plant furnaces being active in December. This action on the part of producers probably saved ruinous results, as prices have been forced to the cost line under the circumstances now existing and larger production would have caused them to go far below, with consequent demoralization. As the year closes, no movements are on foot looking toward increasing producing capacity and until demand renders this step necessary it is improbable that the number of active stacks will be increased.



PRICES OF BARS AND HEAVY MELTING STEEL AT CHICAGO IN 1914

Northern No. 2 foundry pig iron began the year at $14.25, furnace, the decline of the previous two months being checked by a buying movement in January and February that gave promise of continuing. Northern makers for the most part sold more iron than their active capacity would warrant and ran through first half on that basis, sufficient shipments being held up to render it unnecessary to add to producing capacity.

At the beginning of second half, with an adverse, or at least disappointing, railroad rate decision, demand decreased and the price declined to $14, furnace, this level being held until early in September, when a further decline took place to $13.50, furnace, and then under repeated assaults by selling from steel plant furnaces the price declined still further, $13, furnace, being quoted by merchant stacks, but tonnages being sold as low as $12.50, furnace, in some instances, by producers not regularly factors in the merchant market.

A resumption of selling close to Dec. 1 brought a stiffening of price to $13 on a wide inquiry and broadened sale.

Southern iron remained somewhat more steady through the year on restricted sales, the low price of northern iron preventing much selling in competition. Expectation of a radical reduction in the freight rate from Birmingham on pig iron met with disappointment to southern sellers when only 35 cents per ton reduction was granted, applying to only a portion of the northern railroads. This had a further effect of restricting sales in this territory.

Southern iron began the year at $15.35, delivered Chicago, and toward the end of January declined to $14.85, delivered. This level was held quite steadily until the end of August, the quotation being more or less nominal, as the tonnage sold in the north was extremely small, northern prices being too low to permit active competition. From that point the price declined gradually until in December southern iron could be obtained at $13.50, delivered Chicago, a decline of $1.85 from the high point in January, 35 cents of which is due to the reduction in freight rate from Birmingham to Chicago. This leaves a net decline of $1.50 per ton during the year.

Lake Superior charcoal iron stiffened its price 25 cents early in the year after a number of stacks blew out and production was curtailed. The price then remained steady through the remainder of the year on light demand and small production.

Finished steel products began the year at a low level, made two ineffectual efforts to advance and finally dropped back to a level considerably lower than at the first of the year. No essential difference developed between plates, shapes and bars, except that plates have been in less demand and prices have been somewhat weaker without essentially lower quotations being registered.

Railroads lessened their buying materially early in the year and while some cars were bought soon after Jan. 1, this movement soon ceased and a large outlet for plates thus was closed. Agricultural implement buyers and railroads took few steel bars and tightness of money for structural work cut off the demand for shapes, all three products being in small demand throughout the year.

Bar iron fared no better than steel, and though it began the year at 1.15c, Chicago mill, it closed the period at about 0.95c, Chicago mill, and without strength. Rail business has been slack much of the time. Orders have been smaller than usual and few have been received.

Steel sheets have been unsteady through a large portion of the year. Competition by mills further east, which have been willing to divide their freight advantage over Pittsburgh, has forced local makers to protect the Chicago market and low prices have resulted. Demand has been light much of the time and the range of prices has been unusual.

Record low levels have been registered by scrap in this market. Railroads have dumped large accumulations and consumers have taken less than usual. Steel mills and malleable foundries have curtailed so decidedly that sellers found small outlet.

Year of Disappointment in East

Ending With Trade Greatly Reduced in Volume

But With Manufacturers Realizing Tremendous Possibilities of the Near Future—Unusual Features of the Past Five Months Due to the War —Railroads Do Little Buying

BY C J STARK

IN THE year of 1914, the iron and steel industry has found only unrealized expectations and disappointed hopes. Beginning with promise, the year has ended with the iron and steel trade at the lowest ebb in production, in prices and in general conditions, since 1908. A contemplation of the events of the past 12 months offers little cause for satisfaction to producers and the extraordinary state into which business affairs now have been plunged by the European war leaves the immediate future obscured in doubt. Pig iron production of the United States in 1914 reached about 23,230,000 gross tons, which is the smallest in ten years, with the one exception of 1908. The output of ingots and castings probably was about 23,000,000 gross tons, which has not been so low since 1905, barring the off year of 1908. Despite the reduced operations of plants, pig iron stocks in the country increased considerably in the year and were about 1,900,000 tons at the opening of 1915. Steel works were carrying a large proportion of this total.

There were two occasions in the year when iron and steel manufacturers were aroused to the hope that a substantial improvement was at hand, representing, perhaps, the inception of the long-heralded, but yet deferred period of great prosperity for the industry. One of these was the buying movement of January and February; the other was that, smaller in extent, which came during June and July. But both proved to be short-lived and did not expand. The first flattened of its own accord because consumption failed to measure up to it. The other was swept away by the widespread disturbance that attended and followed the outbreak of the war. A review of the extremely light buying of iron and steel products and manufactures by the railroads again points to an important cause for the unhappy condition of the industry. More and more the iron and steel makers of the United States have had demonstrated to them that their prosperity inextricably is woven into that of the railroads and that without a safe and sound position of the transportation interests, it is too much to expect that operations can be maintained on the basis of present capacity or that reasonable prices may be obtained. Accordingly, no single development in recent years has been received with greater satisfaction than the decision of the interstate commerce commission in December, granting eastern railroads a substantial increase in freight rates on most commodities.

The new tariff still remains the undetermined factor of the iron and steel business. The year has afforded no clear demonstration of its direct effects, because of the unusual conditions which have prevailed. The very low prices for all classes of iron and steel which prevailed all year, effectually shut out the danger of foreign competition at the reduced duties. The participation in the war of the three great exporting nations of Europe, Germany, Great Britain and Belgium, now, for the time being at least, has proved an unexpected, but none-theless complete protection for the home industry. The situation, however, involves unusual possibilities at a later date, when, with peace concluded, the belligerent countries may be expected vigorously to pursue in proportion to their unimpaired resources, every market which may help them to rebuild their impoverished fortunes.

The eastern iron and steel industry has had a most discouraging year. Operations have not been at capacity except for brief intervals. Profits at all times have hovered around or reached the vanishing point. The eastern steel industry in 1914 probably did not average more than 50 per cent of output. At the present time, the situation is at its worst and in not a few instances, works are completely idle or running at minimum schedules. Prices for finished materials declined about $3 a ton in the year. Plates, shapes and bars dropped from 1.35c, Philadelphia, to 1.20c, and bar iron from 1.20c, eastern Pennsylvania mill, to 1.05c. Billets were selling at approximately $1 less on Jan. 1, 1915, than they were on the same date one year previously, and were at $20.50, Philadelphia.

Because of the high ocean freight rates, eastern mills were able to realize little from the flood of export inquiries for steel products which was released in this country following the war. Middle western mills, particularly the Steel Corporation, with its owned or chartered boats, were more fortunate and booked a good tonnage of this business. In the business taken were a large tonnage of barb wire for European countries at war, about 15,000 tons of plates for Australia, 150,000 steel sleepers or ties for Greece, which are being made in this country for the first time and many miscellaneous lots of billets, sheet bars, skelp, wire rods and finished products. American mills bid vigorously for this export demand. Billets and sheet bars were quoted $19 to $19.50, Baltimore, and plates at about 1c, Pittsburgh, or 1.13c, tidewater, with other products in accordance. In December, there were some large inquiries in the market, including 30,000 tons of rails and track fastenings for Norway, 10,000 to 15,000 tons of shrapnel bars for Russia, 150,000 ton of billets, blooms and slabs,

and 50,000 tons of shrapnel bars for France. Open market freights then had reached prohibitive figures, the steamship companies quoting 30s to 31½s from eastern seaboard to British ports.

An indifferent demand from consumers, a persistently low level of prices and the enforced restriction of furnace operations to a small fraction of capacity, which prevailed during a large part of the year, were felt severely by the eastern pig iron industry. For the majority of producers, it was the most unsatisfactory period that they had experienced in a number of years. The low point of prices in the year was the most depressed since 1904, and production was reduced correspondingly. The buying movements of the year were of spasmodic character and short-lived. The largest and most continued buying of iron occurred during January and February and prices rose about 25 cents under this impetus, putting northern No. 2X at $15, Philadelphia, and basic at $14.25, delivered eastern Pennsylvania. By the end of February, however, buyers had their forward requirements well covered and activity subsided. Prices held their own, during March and April, on a quiet market, but they weakened 25 cents on some renewal of buying in May. This buying was made up principally of basic for third quarter and last half, sales of which aggregated about 80,000 tons, including 50,000 tons to the Lukens Iron & Steel Co. May sales placed the market at $14, delivered eastern Pennsylvania, for basic, and at $14.75, Philadelphia, for No. 2X. These levels prevailed unchanged in a dragging situation, which continued throughout June, July, August and September. Foundry iron weakened 25 cents in October, but basic remained nominally unchanged. In November, quiet sales of basic established that market at $13.50, delivered eastern Pennsylvania, while further softness in foundry grades brought about another reduction of 25 cents to $14.25, Philadelphia, for No. 2X. The weakness of the eastern foundry market in October and November was augmented by the selling drive of Buffalo makers, who swept practically all sections of the east at a severely low schedule. The Buffalo market dipped as low as $11.80, furnace, though the large part of the tonnage was booked on the basis of $12 for No. 2X. From 250,000 to 300,000 tons of iron, principally for first quarter and first half, were taken by Buffalo makers in their aggressive effort for business during October and November.

One of the unusual features of the market in the east was the invasion of that territory by Canadian pig iron. From 15,000 to 20,000 tons of Wabana high phosphorus foundry iron were sold during February to buyers in eastern Pennsylvania and New England by the Dominion Iron & Steel Co., of Sydney, Nova Scotia. Most of this metal was taken by cast iron pipe makers along the Delaware river, such as the United States Cast Iron Pipe & Foundry Co. and R. D. Wood & Co., and the price was about $13.50, delivered. The free duty on pig iron allowed under the new tariff act, largely made possible the importation of this iron. Not all the tonnage sold, however, finally was delivered. Five cargoes, totaling approximately 15,000 tons, came in and the balance was cancelled. Practically all the tonnage sold was closed in February. After that, the Dominion Iron & Steel Co. was less anxious to sell, and in a short period withdrew its prices. This importation of Nova Scotia iron represented the only invasion of the eastern market by foreign metal in the year. Because of the unusually low stage of prices, there was small opportunity for foreign iron to compete with the domestic brands, despite the elimination of all duty. There was further talk at times of offers of Indian and English iron, but the low market blocked any such sales.

Gray forge iron was in only limited demand in the eastern Pennsylvania market throughout the year, because of the reduced melt of cast iron pipe foundries and of the puddling works. In January, 1914, gray forge was selling at about $14, delivered eastern Pennsylvania. In May, it was at $13.75, delivered, declining in September to $13.50, delivered, and in November to $13.25, delivered. Pipe makers took some fair-sized blocks at the latter price in November and December.

Standard low phosphorus iron was better maintained in price than other hands for most of the year. The Philadelphia market, however, dropped $1 to $2 a ton in November, when new competition appeared from furnaces which had undertaken the production of this grade with foreign ores. Sales of 0.03 iron were made then at $18.75, Philadelphia, and of 0.035 iron at $18.50, Philadelphia. Lebanon low phosphorus declined from about $18 to $16, furnace.

Virginia makers struggled with a poor market, both because of the reduced melt in the territory which they logically supply and to the low prices ruling on northern brands, with which they were unable to compete in eastern Pennsylvania, New England, and in other eastern districts. The fluctuation in Virginia iron prices was very narrow, beginning the year at $12.75, furnace, for No. 2X, and closing at $12.50, furnace. On Jan. 1, 1914, Virginia producers possessed an aggregate order book of about 60,000 tons. At the beginning of 1915, this had shrunk to about 35,000 tons. The competitive position of Virginia furnaces was helped slightly by reductions in freight rates to New England, eastern Pennsylvania, and other northeastern points, which went into effect Oct. 15. Alabama makers also were aided considerably by the reduction in freight rates to northern points, especially to New England, where a rail and water rate of $4.25, to Boston common points, and of approximately $5 to $6 to other interior points, was established. It is believed this reduction will operate to considerably increase the consumption of Alabama iron in New England territory.

Blast furnace operations in the eastern industry were at approximately 33-1/3 per cent of capacity at the beginning of 1915. Statistics showed 12 merchant furnaces active and 45 idle, including a number of unserviceable plants and nine non-merchant

(*Continued on page 97*)

AVERAGE MONTHLY PRICES OF RAW AND FINISHED MATERIALS IN THE EAST DURING 1914

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Basic pig iron eastern Pennsylvania.....	$14.00	$14.25	$14.25	$14.25	$14.00	$14.00	$14.00	$14.00	$14.00	$14.00	$13.50	$13.50
No. 2X Foundry, Philadelphia.....	14.75	15.00	15.00	15.00	14.75	14.75	14.75	14.75	14.75	14.50	14.25	14.25
No. 2X, Virginia furnace.....	12.75	12.75	12.75	12.75	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50
Standard low phosphorus, Philadelphia...	21.00	21.00	21.00	21.00	21.00	20.50	20.50	21.00	21.00	21.00	19.00	19.00
Standard gray forge, Philadelphia.....	14.00	14.00	14.00	14.00	13.75	13.75	13.75	13.75	13.50	13.50	13.25	13.25
Open-hearth billets, 4 x 4, Philadelphia.	21.50	23.00	23.50	23.50	22.50	22.00	22.50	22.50	22.50	22.50	21.50	20.50
No. 1 heavy milling steel, eastern Pa...	10.50	11.25	11.50	11.00	10.75	10.75	10.50	10.75	10.75	9.75	9.50	9.50
No. 1 railroad wrought, eastern Pa.....	13.25	14.75	14.00	13.00	12.50	12.50	12.00	12.25	12.50	11.50	11.50	11.50
Heavy machinery cast, eastern Pa.....	12.50	13.00	13.00	13.00	12.50	12.50	12.25	12.25	12.25	11.50	11.25	11.50
Tank plates, base Philadelphia.....	1.35c	1.30c	1.30c	1.30c	1.25c	1.25c	1.25c	1.30c	1.30c	1.25c	1.25c	1.20c
Structural shapes, base Philadelphia.....	1.35c	1.30c	1.30c	1.30c	1.25c	1.25c	1.25c	1.30c	1.30c	1.25c	1.25c	1.20c
Steel bars, base Philadelphia.....	1.35c	1.35c	1.35c	1.30c	1.30c	1.25c	1.25c	1.35c	1.30c	1.30c	1.25c	1.20c
Common iron bars, eastern Pa. mill.....	1.20c	1.20c	1.20c	1.15c	1.15c	1.10c	1.10c	1.15c	1.15c	1.10c	1.05c	1.05c

Pittsburgh Greets the New Year

With Confidence in a Change for the Better

Business Struggled Through First Six Months and Was Given a Jolt by the Declaration of War—Some Improvement Late in the Year—Very Little Disturbance Among Workingmen

BY C F WILLIAMS

THE history of the iron and steel market at Pittsburgh in 1914 is closely interwoven with a singular story of disturbances,—industrial, financial, political, economic and social. The year cannot be compared with any preceding 12-months period; it has no parallel in the annals of the market.

Nineteen hundred and fourteen opened under inauspicious conditions, with gloomy clouds hanging over the horizon. Men at the helm of business dared not proceed, except with extreme caution, because of the uncertainty in regard to the future. Scarcely had losses sustained by the war in the Balkan states been forgotten when serious trouble loomed up in Mexico. War seemed imminent for many weeks. The Mexican situation showed but little improvement, even at the close of the year.

At Washington, congress was busy revising the banking and currency laws of the country; supplementing the Sherman anti-trust act by the Clayton law; considering several acts directly aimed at "big business"; discussing the advisability of imposing tolls upon American coastwise ships in connection with the Panama canal act; perfecting a so-called war revenue bill to raise about $100,000,000,—all of which, regardless of the merits or ultimate importance of the individual measures,—helped to cause hesitancy among sellers and buyers of iron and allied commodities.

Business struggled along at a slow, quiet gait, through the first six months, only to find the outlook more uncertain than ever. Shortly after a rift appeared in the clouds, half of civilized Europe was thrown into the most stupendous war in the history of the world. The channels of international commerce and finance were summarily cut off; the whole world faced an unprecedented situation which has not yet cleared. And yet, through it all, the captains of finance and industry in the United States kept their course. With many of the disturbances of 1914 entirely liquidated, it generally is believed at Pittsburgh that the market has finally rounded the turn. A gradual resumption is expected.

Pittsburgh mill managers hope the old adage—it is darkest before dawn—has again come true. Certain it is that the requirements of our 92,000,000 of population are real, not imaginary. Consumers' stocks are low; capital no longer is threatened; dangers made possible by previous currency and banking laws apparently have been eliminated; railroads in central classification territory, by reason of recent freight rate advances, are in a position to replace track and rolling stock, and farmers are prosperous. Moreover, the doors to world-wide trade have been thrown open to American manufacturers, who have been made more independent by the war devastating Europe.

Iron and steel plants in the Pittsburgh district reduced forces to a minimum during the year; some mills closed down entirely. Stock dividends were deferred or reduced in many instances. Salaries and wages were cut at a great many mills, and talk is heard of general wage reductions affecting skilled labor, shortly after Jan. 1. Commodities sold at comparatively low prices and no large profits were enjoyed. But prospects for a fairly satisfactory year are much brighter than they have been at any time since the close of 1912.

Pig Iron

Nineteen hundred and fourteen was a year of disappointment to blast furnace owners. Low prices, described as unremunerative by some pig iron dealers, prevailed throughout the year, and, at no time during the first 10 months was demand heavy. Despite curtailed operations throughout the country, heavy stocks were accumulated at merchant and non-merchant plants, it being conservatively estimated that total stocks in the country the latter part of the year aggregated approximately 2,000,000 tons.

Prices of steel-making and foundry grades of pig iron showed no important change in position the first half of 1914. The year opened with bessemer quoted at $15.15, basic at $13.50 and No. 2 foundry at $13.90, delivered Pittsburgh. By the beginning of the second quarter, bessemer and basic each had declined 25 cents a ton; they remained stationary until November, when bessemer dropped to $14.70 and basic to $13.45, Pittsburgh; foundry, in the meantime, had sagged to $13.70, and some tonnage sold at $13.50, Pittsburgh, the eleventh month of the year. On Sept. 26, freight rates from the valleys were advanced from 90 cents to 95 cents a ton, which gave nearby stacks a slightly greater advantage over those in the valleys. Low prices are attributed to absence of demand, and the aggressiveness of sellers who could not discontinue operations altogether without embarrassment.

Indications of active buying movements were in evidence several times the first six months, but sales did not involve really heavy tonnages until after the middle of the fourth quarter. Prominent consumers, located in the eastern, Buffalo, central western, southern and Pittsburgh districts took part in a buying movement which was in full swing Dec. 1. Heavy tonnages were sold at the expense of prices. In this district, the American Steel Foundries took about 25,000 tons of basic at $12.50, valley, and slightly less; the Standard Sanitary Mfg. Co. took 24,000 tons of northern and southern foundry grades, and several

other large tonnages were sold. Steel making companies, which usually figured in the market for large tonnages, took no part in the pig iron buying movements in 1914.

Billets and Sheet Bars

While demand for most lines of finished steel products in 1914 was comparatively light, makers of semi-finished material enjoyed fairly satisfactory activity. Tin plate makers, who experienced a good year from a production standpoint, increased normal specifications for sheet bars to a moderate extent. Material was obtained at rather low figures, the average price of sheet bars in 1914 falling about $2.50 below the average price obtained over a period of five years, according to several prominent manufacturers.

Billets were quoted at $20 and sheet bars at $21, mill, Jan. 1, 1914, and they advanced to the highest levels of last year, which were in February, when billets and sheet bars commanded $21 and $22, respectively. In May, prices of each product fell off $1 a ton, and quotations were again reduced 50 cents a ton in July. In August, billets and sheet bars sold at $19 and $20, respectively. Shortly after the outbreak of the European war, rather sharp advances featured the market, billets and sheet bars again advancing to the basis of $21 and $22, mill, but rather low figures developed in November and December. In the last month, billets were offered at $18.50 and sheet bars at $19, mill, for prompt shipment. Before the end of the year, the Carnegie Steel Co. opened books for first quarter at a minimum of $19 for billets and $20 for sheet bars. A study of the price table indicates that open-hearth and bessemer sheet bars sold at a range from $19 to $22, and billets from $18.50 to $21, makers' mill, in 1914.

Plates, Shapes and Bars

Manufacturers of structural shapes, plates and bars confronted unsatisfactory conditions the greater part of 1914. At no time during the year was demand heavy; mills operated at less than 50 per cent of capacity most of the second half, and material was offered at almost unremunerative figures at least six months of the year. Demand from fabricating shops was far below normal, and car builders called for comparatively small tonnages.

The decision of the interstate commerce commission, Dec. 18, giving railroads in official classification territory a 5 per cent freight rate advance on many commodities, is expected to develop activity for car builders, but the effects of the decision probably will not be felt until some time after Jan. 1. Car orders were decidedly light in 1914. In the first 11 months, not more than 67,000 steel cars were ordered. In 1913, approximately 100,000 steel cars were purchased; 235,000 cars were bought in 1912 and about 136,000 were ordered in 1911. Car shops in western Pennsylvania operated on greatly reduced schedules the last seven months of the year.

Hot rolled products did not sell at attractive figures. The year opened with plates, shapes and bars listed at 1.20c, and that figure represented the market until April, when material was freely offered at 1.15c. Quotations declined to 1.10c before the middle of the year; but they showed moderate strength in August and September, advancing to 1.20c. In October, quotations sagged to 1.15c and all three products sold at 1.10c in November. The last six weeks of the year practically every manufacturer offered hot rolled products at 1.05c, Pittsburgh, and frequent reports were heard that some mills shaded the Pittsburgh price by waiving freight differentials.

Sheets

Steel sheet products showed considerable irregularity in 1914, a year characterized by small profits and curtailed operations. The Pittsburgh basing price was disregarded in a great many instances, mills favorably located making it a not unusual practice of waiving freight differentials in order to obtain desirable tonnages. During the last six months of the year, mills did not produce much above 60 per cent of capacity.

Published quotations show prices were fairly steady all year, but they were decidedly unattractive. While quotations did not sag much below low levels of the preceding year, yet mill managers did not enjoy the high prices which prevailed in 1913. In 1912, blue annealed sheets sold at a range of $6 a ton; in 1913, $8, and in 1914, $1 a ton; black sheets, in 1912, sold at a range of $10 a ton; in 1913, $10, and in 1914, $3 a ton; galvanized sheets sold at a spread of $12 a ton; in 1913, $13, and in 1914, $4 a ton. The following table shows the trend of the market in 1914:

	Gage.	Low.	High.	Range per ton.
Blue annealed...	10	1.35c	1.40c	$1.00
Black	28	1.80c	1.95c	3.00
Galvanized	28	2.75c	2.95c	4.00

Although average prices for the year were low, makers were able to buy material entering into the manufacture of steel sheets at correspondingly low quotations. But the year

MONTHLY MINIMUM PRICES AT PITTSBURGH IN 1914

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Bessemer	$15.00	$15.09	$15.15	$14.90	$14.90	$14.90	$14.90	$14.90	$14.90	$14.85	$14.70*	$14.70
Basic	13.42	14.09	13.96	13.90	13.90	13.90	13.90	13.90	13.90	13.75	13.45*	13.45
No. 2 foundry	13.70	14.09	14.15	14.15	14.09	13.90	13.90	13.90	13.90	13.80	13.70*	13.70
Malleable	13.90	14.09	14.15	14.15	14.15	13.96	13.90	13.90	13.90	13.80	13.70*	13.70
Gray forge	13.50	13.59	13.65	13.65	13.65	13.65	13.65	13.65	13.65	13.60	13.45*	13.45
Ferro manganese, Baltimore	44.00	38.75	38.50	38.00	38.00	38.00	37.60	82.00	88.75	69.40	67.75	68.00
Ferro silicon	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00
Bessemer billets	20.00	21.00	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
Open-hearth billets	20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
Bessemer sheet bars	21.00	22.00	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.62	19.00
Open-hearth sheet bars	20.60	21.75	22.00	21.60	21.00	20.75	20.20	21.00	22.00	21.60	19.62	19.00
Steel rails	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c
Beams	1.20c	1.20c	1.20c	1.18c	1.15c	1.11c	1.11c	1.17c	1.20c	1.17c	1.11c	1.05c
Plates	1.15c	1.20c	1.20c	1.15c	1.12c	1.10c	1.11c	1.16c	1.18c	1.14c	1.09c	1.05c
Steel bars	1.20c	1.20c	1.20c	1.15c	1.15c	1.11c	1.11c	1.17c	1.20c	1.17c	1.10c	1.05c
Iron bars	1.31c	1.30c	1.30c	1.30c	1.30c	1.27c	1.23c	1.20c	1.20c	1.20c	1.20c	1.15c
Tin plate	$3.40	$3.40	$3.40	$3.40	$3.38	$3.30	$3.27	$3.46	$3.55	$3.36	$3.17	$3.20
No. 28 gage black sheets	1.86c	1.94c	1.95c	1.92c	1.87c	1.82c	1.80c	1.88c	1.95c	1.93c	1.89c	1.80c
No. 28 gage galvanized sheets	2.86c	2.94c	2.95c	2.92c	2.80c	2.77c	2.75c	2.85c	2.95c	2.93c	2.86c	2.80c
No. 10 blue annealed sheets	1.37c	1.40c	1.40c	1.40c	1.37c	1.35c	1.35c	1.37c	1.40c	1.40c	1.39c	1.35c
Wire rods	$25.50	$25.88	$26.00	$26.00	$26.00	$25.50	$24.80	$24.50	$25.62	$26.00	$25.75	$25.00
Wire nails	1.55	1.59	1.60	1.60	1.57	1.50	1.51	1.55	1.55	1.59	1.59	1.50
Plain wire	1.35	1.39	1.40	1.40	1.37	1.30	1.31	1.35	1.35	1.39	1.39	1.30
Hoops	1.40c	1.30c	1.30c	1.26c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c	1.25c
Heavy melting steel	$11.05	$12.37	$12.25	$12.00	$12.00	$12.00	$11.55	$11.50	$11.44	$10.75	$10.06	$10.35
Structural rivets	1.62c	1.60c	1.60c	1.60c	1.60c	1.56c	1.50c	1.50c	1.55c	1.48c	1.45c	1.45c

*Freight rate from valleys to Pittsburgh advanced from 90 to 95 cents a ton Oct. 26, 1914.

just ended does not compare favorably with 1913 or 1912.

Tin Plate

Generally speaking, the market for tin plate is not affected by industrial and economic influences which often cause serious depressions in other lines of finished material. Such proved to be the case in 1914. Despite the extended period of irregularity and uncertainty, which featured the general iron market, tin plate mills last year were comparatively busy. When production figures are announced, it is probable they will show an increase of not less than 10 per cent above those for 1913. Demand for goods in tin containers is increasing each year, and the scarcity of labor, wage reductions and an uncertain financial situation during a portion of the year created a heavier demand for tinned goods.

Books for the year were opened Nov. 3, 1913, at $3.40 per base size box, or $4 a ton lower than the price announced at the beginning of the previous season. Leading packers were under cover before Jan. 1, 1914, and, as usual, more important consumers were able to shade the "official" price by a broad margin. Material dropped to $3.20 per base box and even lower during the summer, but sharp advances characterized the market when nearly all of civilized Europe became engaged in a conflict that summarily shut off channels of foreign trade and commerce. Pig tin quotations jumped to abnormal levels and tin plate soared to as high as $3.75 a box before the restoration of normal market conditions. For two months prior to the opening of books for 1915 delivery, on Dec. 3, 1914, tin plate sold at decidedly low levels, sagging to $3.10 a box in some instances. On Dec. 3, last, the American Sheet & Tin Plate Co. opened books for the first half of 1915 on the basis of $3.20 per base size box, but that figure was shaded $1 and $2 a ton in many instances.

Prospects for an active season are bright, but prevailing quotations are unsatisfactory. Normal demand probably will be augmented by the European war.

While mills manufacturing wire products were comparatively busy during the year just ended, yet they were forced to offer products at decidedly low levels in order to take business. The bulk of the tonnage shipped in 1914 was sold on the basis of $1.50 a keg for nails; that figure represents the low point of the market for the last decade and a half. Several attempts were made to advance prices, but each one of them failed; they even failed to stimulate buying.

In 1912, wire nails sold at a range from $1.55 to $1.75 a keg; in 1913, from $1.55 to $1.80; in 1914, from $1.50 to $1.60, but, as previously pointed out, not much material commanded above the minimum price in 1914. During the depression of 1898-99, nails sagged to $1.15 a keg, but advanced to the abnormally high level of $3.20 a keg before the end of 1899. The price situation in 1914 explains, to a considerable extent, why wire mill managers in some instances voted not to declare stock dividends, unremunerative prices making it practically impossible for them to enjoy profits. The European war had a beneficial effect upon the market for wire nails, barbed wire and wire rods, although the effects of the war upon commerce and finance undoubtedly injured the domestic market to a considerable extent. Belligerent nations figured conspicuously in the American market immediately after hostilities were declared; heavy tonnages of barbed wire, nails, wire rods and horseshoes, one of the products of the American Steel & Wire Co., were obtained by England, France and Russia. Each one of these nations sent representatives to this country to buy material, and, as a consequence, wire and rod mills were active after Aug. 15. Domestic producers were able to meet the requirements of foreigners without incurring much additional expense.

Tubular Goods

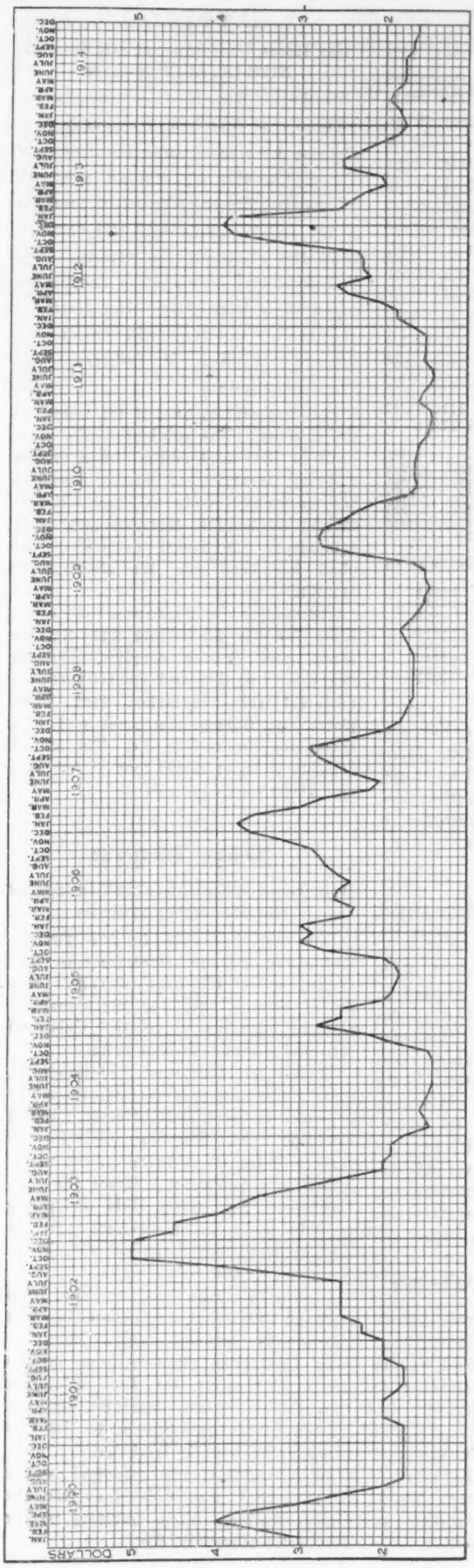
Iron and steel pipe manufacturers have rounded out a year of inactivity, during which prices showed considerable irregularity, despite the fact they were low. Mills operated at 50 per cent of capacity and less during the greater part of the 12-months period, and prospects for improvement were not bright at the end of the season. The outbreak of the war in Europe terminated several contracts involving pipe for export, made impossible the shipment of oil to foreign countries for several weeks, and brought activity in the oil fields to a sudden halt. Plans for numerous oil and gas projects were abandoned, promoters being unable to finance undertakings, and operations in the oil territories were curtailed severely during the last five months of the year. The year opened with steel pipe selling at prices adopted Oct. 27, 1913, which corresponded to quotations ruling the early part of that year. An attempt was made to advance prices $1 a ton, Feb. 2, but the card issued under date of Oct. 27, 1913, again became effective, April 20, last. On

TABLE SHOWING MONTHLY MINIMUM PRICES CONNELLSVILLE FURNACE AND FOUNDRY COKE PER TON AT THE OVENS IN 1914

Months.	—Furnace— Prompt.	Contract.	—Foundry— Prompt.	Contract.
January	$1.79	$1.85	$2.48	$2.50
February	1.82	1.92	2.40	2.50
March	1.94	2.00	2.40	2.50
April	1.90	2.00	2.40	2.50
May	1.77	2.00	2.40	2.50
June	1.75	1.85	2.35	2.40
July	1.75	1.85	2.29	2.40
August	1.75	1.80	2.25	2.36
September	1.67	1.75	2.25	2.35
October	1.65	1.67	2.21	2.25
November	1.60	1.65	2.10	2.25
December	1.60	1.70	2.00	2.25
Average for year	1.75	1.84	2.29	2.39

TABLE SHOWING QUOTATIONS ON COKE FOR PROMPT DELIVERY PER TON AT OVENS IN CONNELLSVILLE REGIONS

	—Furnace— 1910.	1911.	1912.	1913.	1914.	—Foundry— 1910.	1911.	1912.	1913.	1914.
January	$2.48	$1.41	$1.84	$3.88	$1.79	$3.03	$1.97	$2.05	$4.45	$2.48
February	2.33	1.44	1.85	2.56	1.82	2.95	1.95	2.22	3.69	2.40
March	2.10	1.58	2.06	2.41	1.94	2.77	2.00	2.65	3.50	2.40
April	1.70	1.55	2.44	2.25	1.90	2.54	1.99	2.75	3.06	2.40
May	1.60	1.44	2.57	2.00	1.77	2.29	1.90	2.62	2.89	2.40
June	1.63	1.40	2.17	2.04	1.75	2.21	1.77	2.56	2.85	2.35
July	1.63	1.42	2.25	2.50	1.75	2.10	1.80	2.46	2.85	2.29
August	1.62	1.51	2.25	2.50	1.75	2.17	1.85	2.60	2.85	2.25
September	1.60	1.50	2.31	2.31	1.67	2.13	1.85	2.67	2.85	2.25
October	1.59	1.50	3.22	2.07	1.65	2.09	1.86	3.35	2.76	2.21
November	1.49	1.50	3.82	1.84	1.60	2.01	1.89	4.41	2.50	2.10
December	1.45	1.64	3.93	1.75	1.60	2.00	1.90	4.50	2.50	2.00
Average	1.77	1.48	2.55	2.34	1.75	2.36	1.89	2.90	3.06	2.29



FLUCTUATION OF COKE PRICES FOR LAST 15 YEARS SHOWN GRAPHICALLY

Nov. 2, quotations were reduced $2 a ton on all sizes; but the waiving of a previous extra preferential discount of 2½ per cent made the reduction equivalent to only $1 a ton. Iron pipe discounts remained stationary all year. Boiler tubes showed irregularity during almost the entire year; steel boiler tubes sold as low as 74 off for base size the last quarter, or $4 a ton below the nominal market price.

The National Tube Co. and all independent manufacturers curtailed outputs the last half of the year, and many mills operated at greatly reduced schedules the first and second quarters.

Old Material

Iron and steel scrap jobbers in 1914 experienced one of the most unprofitable years in their history. Prices dropped to historic low levels, and some middlemen were forced to sustain losses in order to move material. At no time during the year was demand heavy; consumers bought only for immediate requirements, and they succeeded in controlling the market at critical times. The old materials market, it will be recalled, started to fall off in November, 1912, and some grades have failed to recover former positions.

Heavy melting steel, in the initial month of 1914, sold at a range from $10.75 to $11.50, and as high as $12.75 a ton was obtained in February. After the opening of the second quarter, this grade sold at $12 a ton and less. During October and November prices fell off considerably, material being freely offered at $10 a ton the latter part of November. At no time during the season did heavy melting command as much as basic pig iron; under normal conditions both commodities sell at approximately the same figures.

Middlemen are sanguine about the future. Consumers' stocks are low, and indications are that finishing mills will enjoy moderate activity before the beginning of the second quarter. The scrap market will not become active until the market for finished products improves.

Coke

The decline in pig iron output in 1914 was felt keenly by Connellsville coke operators. Coke oven plants in the upper and lower Connellsville regions were operated at greatly reduced schedules during almost the entire year; wage reductions were made at a number of plants and dealers were forced to sell at low figures to obtain business. Figures showing production for the year will fall far below those for 1913, when 20,097,901 tons were produced. In the first three quarters of the year just ended, 11,200,049 tons were produced, a loss of 4,413,755 tons, compared with the corresponding period in 1913.

From a standpoint of production and prices, 1914 was similar to 1911, when production was 16,334,174 tons. In 1911, the average price of blast furnace coke for prompt delivery was $1.48; in 1914, $1.75 a ton at the ovens; the average price of foundry coke for immediate shipment in 1911 was $1.89; in 1914, $2.29 a ton at the ovens. The accompanying table shows price comparisons of furnace and foundry coke the last five years; the accompanying line chart shows the trend of prices over a 15-year period.

Furnace coke for prompt delivery hovered around $1.75 a ton at the ovens practically all year in 1914. Some coke sold at about $2 a ton in March, but fuel was offered as low as $1.50 a ton the last quarter of the year. Leading sellers of 72-hour coke last year asked $2.50, ovens, but some grades were sold at $2, ovens.

A study of the line chart indicates that during the last 11 years furnace coke has sold at a range between $1.40 and $5 a ton at the ovens. The minimum figure prevailed in 1904, and the maximum quotation was obtained in 1902. Not once during 1914 was the 400,000-ton mark reached for weekly production; the most active week in the year ended March 21,

when 364,080 tons were produced. In 1913, the 400,000-ton figure for weekly production was passed 21 times. In the last quarter of the year, weekly production hovered around the 200,000 mark; for the week ending Nov. 28, the lightest week in the year, production was 179,439 tons. Production figures are taken from the Connellsville *Courier*.

Coke buying did not become active until the latter part of the year, when the Youngstown Sheet & Tube Co., Corrigan, McKinney & Co., the Buffalo Union Furnace Co., W. P. Snyder & Co., the Wickwire Steel Co., and several other prominent consumers covered requirements for periods extending from three months to two years. The bulk of the tonnage sold for extended shipment was on sliding scale contracts, based upon pig iron prices, with minimums of $1.70 and $1.75 a ton at the ovens.

Coke shipments from the upper and lower Connellsville regions since 1907, according to the *Courier*, were as follows: 1907, 19,029,058 tons; 1908, 10,700,022; 1909, 17,785,832; 1910, 18,689,722; 1911, 16,334,174; 1912, 20,000,873; 1913, 20,097,901 tons.

Labor Conditions

Except for a strike at plants controlled by the Westinghouse interests, which extended from June 5 to July 13, the year just ended was practically free from labor trouble. Westinghouse employes returned to work under conditions which existed before the plants were shut down by a general walk-out.

Failure of puddlers identified with the United Sons of Vulcan to obtain a flat rate of $7 a ton for boiling, asked July 1, 1913, has almost entirely disrupted that organization; mills formerly operating under wage agreements with the Sons of Vulcan now are running either under independent scales or under schedules of the Amalgamated Association of Iron, Steel and Tin Workers.

The Amalgamated Association, at the end of the fiscal year, June 30, 1914, attempted to advance the boiling rate from the basis of $5.25 to $6 a ton on a 1c bar iron card, but had to be contented with a $5.50 rate, which went into effect July 1. The 1914-15 card provides an advance of 10 cents a ton for boiling for each 0.05 cent advance in bar iron selling average, up to the 1.30c card, as against an advance of 15 cents provided by the 1913-14 card. After the 1.25c card has been reached, boiling rates for 1914-15 are identical with those in effect the previous year, a 20-cent advance for boiling being allowed for each 0.05 advance in bar iron selling averages.

With mills, coke plants, blast furnaces and allied industries operating at greatly reduced schedules, the army of the unemployed was swelled to great proportions during the year, it being estimated that 1,000,000 men were laid off by steel and allied industries. On Oct. 1, the Carnegie Steel Co. placed itself in a position to adjust wages after Dec. 31, but Judge Elbert H. Gary, chairman of the board of directors of the United States Steel Corporation on Dec. 22, announced that there would be no change in wages for the present. Judge Gary, intimated, however, that skilled laborers and men on piece work might be affected. Many salaried employes were cut 10 to 15 per cent the last six months of the year, and wages were reduced at a number of coke and blast furnace plants.

BI-MONTHLY SETTLEMENTS SHOWING AVERAGE PRICES OF BAR IRON

	1912.	1913.	1914.
Jan.-Feb.	1.187c	1.4831c	1.1590c
Mch.-Apr.	1.195c	1.5434c	1.1760c
May-June	1.2183c	1.5272c	1.1257c
July-Aug.	1.2518c	1.5029c	1.0928c
Sept.-Oct.	1.3351c	1.3931c	1.0847c
Nov.-Dec.	1.40c	1.2030c	.....

ANNUAL AVERAGE OF SETTLEMENTS.

1913.....	1.4421c
1912.....	1.2645c
1911.....	1.2598c
1910.....	1.4423c
1909.....	1.360c
1908.....	1.386c
1907.....	1.627c
1906.....	1.587c

Sheet Mills Are Started

The Western Reserve Steel Co., which has been building sheet mills at Warren, O., on Monday started in operation its Nos. 3, 4 and 5 sheet mills. A successful day's run was made, the machinery moving right along and the tonnage output being satisfactory in every way. It is expected confidently that the other three mills will be started soon, so that all six mills of the plant will be in operation by Jan. 15, including the roofing and galvanizing departments.

Inquiry From Ireland

Cooke & Byrne, 60 Harcourt street, Dublin, have written THE IRON TRADE REVIEW stating that they would like to get quotations on large quantities of barbed wire, wire nails, lathes, etc., for quick delivery. The buying agent for this firm is now in Chicago, and their attorneys, Alden, Latham & Young, Corn Exchange Bank building, Chicago, will be authorized to make the necessary contracts.

Ryerson

Has Taken Over Plant of Zug Iron & Steel Co. at Pittsburgh

Pittsburgh, Jan. 5.—It is officially announced that Joseph T. Ryerson & Son, Chicago, have taken over the Zug Iron & Steel Co., this city, and will supervise the manufacture and sale of its products in the future. Shipments will continue from the plant for the present. The equipment may be moved to another location at a later date. The personnel of the Zug company will remain unchanged. William M. Wherry, New York, is president.

The Zug mill is one of the oldest in this district. The original works were built in 1845, and consist of 22 single puddling furnaces, 11 heating furnaces and six trains of rolls. A sheet mill, containing 12 heating furnaces and other equipment, was added in 1895. The plant has been idle for about three months.

The company manufactures high grade irons for use in forging and machine shops, and railway supplies including heavy sizes of flats and squares made on universal rolls, horseshoe bars, black plates for tinning and steel and iron sheets for corrugating, etc. The annual capacity is about 22,500 tons of bar iron and 14,000 tons of sheets.

Pier Work

Will Require Considerable Tonnage of Shapes—Other Projects

Bids will be taken by the government, Jan. 23, on 5,000 tons of fabricated work, 100 tons of rails, some pipe, castings, etc., for the construction of pier No. 7 of the Cristobal terminal docks, Panama canal.

Irwin & Leighton, Philadelphia, have taken the general contracts for a power house for the Victor Talking Machine Co., Camden, N. J. 500 tons, and for an addition to the warehouse of Townsend, Grace & Co., Baltimore, 500 tons. Bids are going in this week on a breaker for the Lehigh & Wilkesbarre Coal Co., Wanamie, Pa., 1,000 tons.

In the Chicago market, the total tonnage involved in business just closed is nearly 4,000, including four California projects, the largest being 1,200 tons for fire tanks, on the Pacific coast awarded by the United States government to the Des Moines Bridge & Iron Co.

At Cleveland, the principal award of the week was 2,500 tons for the Union National Bank building to the McClintic-Marshall Co.

Prices of British Plates Advance

Owing to Large Profits Realized From High Freight Rates—Pig Iron Quotations Continue to Climb

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Dec. 21.

The atrocious weather conditions are making everybody sympathetic with the soldiers, in their terrible work in the trenches. The last few days have, nevertheless, registered important successes by the allied armies, and the troops in movement towards the seat of war, although not formally reported in the newspapers, make an enormous aggregate. It is believed here that we are on the eve of very important developments. The feeling is entirely hopeful, and the appalling total of casualties developing from the recent seaside raids have intensified the national determination to see justice done, on behalf of the unfortunate victims. Trade generally is thoroughly healthy, but complaints of labor scarcity daily increase in number, and every enlistment now becomes a matter of very material concern from the commercial point of view. The reduction of coal output is large, some pits having closed, while others are working single instead of double shifts. The unemployment returns show some little improvement, compared with last year. In the engineering trades, the percentage of unemployment is 1.7, compared with 2.9 a year ago.

Pig Iron Hardens

The condition of the pig iron market is steadily hardening and prices are rising almost from day to day. The latest Cleveland quotation is 53s 7d (\$12.56), and the amount in store there is 102,000 tons, a further slight reduction. The uneasiness about the North sea has somewhat affected shipments there, but the large home demand prevents any serious giving way in price. Practically all Midland brands are 2s (48c) dearer than they were a week ago. The west of Scotland is sharing the improvement largely because of the increased activity in shipbuilding. East coast hematite has advanced to 72s 6d (\$17.40) at the furnaces, the last half crown having been directly due to the East coast raid, which caused anxiety as to the supplies of special imported ores. The manufacture of armaments calls for a heavy tonnage of ordinary and special hematites. The demand for high-class alloys tends to increase; a number of makers of high-speed steel are taking tungsten from the United States at prices said to be in the neighborhood of 5s per pound. Some British ferro-tungsten is also being used, and the necessary ferrochrome for armaments is readily obtained from France, which recognizes the importance of supplying the requisite war material. The prospects for raw material well into the new year are entirely cheerful, and a very busy quarterly meeting in January is looked for.

Finished Iron and Steel

The iron and steel trades are very busy in all finished departments. Scotland is looking up, owing to the rapid development of shipbuilding orders. In spite of the large tonnage placed, ship-owners are still negotiating for steamers. The profits realized through the high freights are better than for some years, and this has enabled ship plate makers to run up their prices in a manner quite satisfactory to themselves. The steelmakers in Scotland are asking £7 5s (\$34.80) per ton less 5 per cent, for ship plates, for home requirements. For export the rate is £7 (\$33.60) less 2½ per cent. Makers of black sheets are selling large quantities to Spain, Portugal, France and Russia at £8 5s (\$39.60) less 5 per cent. Very good lines have been secured by bridge builders and structural engineers. It is said the export demand is very pressing, and it is concluded that the shutting off of German supplies is now affecting business in earnest. The position of raw steel is also very strong. In the Sheffield district, makers are asking £8 5s (\$39.60) for open-hearth, and £7 15s (\$37.20) for bessemer steel. The unsatisfactory condition of the tin plate business is keeping down the price of tin plate bars to £4 15s (\$22.80), but some of the makers in that district are diverting their production to finished material wherever they can do this. There is every probability that many steel works will have the shortest possible Christmas holiday, and those devoted to war material will, in many cases, work on Christmas day, with an extra hour for their Christmas dinner. The pressure of government orders for armor and shells is such that the plant is kept going days and nights and Sundays.

The dullest department is railway steel, for which demand is decidedly poor. The railways are evidently determined to keep back their orders until the demand for war material is much less pressing. Makers of heavy hammers, spades, shovels and all kinds of small steels are enjoying a boom, and large quantities of steel parts for transport wagons are also being called for. Remarkable activity has developed in a comparatively new line, namely bullet-proof steel plates, for the protection of air craft and armored motors. The steels have already been employed very successfully by airmen at the front, and it is said they have proved very effective, in some cases, in the actual saving of life.

The demand for cutlery is mainly restricted to war requirements, and this causes some irregularity. By far the most active department is that for machine tools, for which demand has completely outpaced supply. This alone has made the foundries very busy, and it is very likely that, while America has already booked large orders in this line, still larger contracts may be looked for.

Extensions of open-hearth furnaces are being pushed forward in Sheffield, and some are approaching completion. The effect will be to increase very greatly the capacity of plants in that city.

Changes in Koppers Company Officials

At a recent meeting of the stockholders of H. Koppers Co., A. W. Mellon, R. B. Mellon and H. B. Rust, all of Pittsburgh, were elected members of the board of directors; and, with Heinrich Koppers, of Germany, and James C. McMath, of Chicago, constitute the board. Mr. Rust was elected president of the company. Mr. Koppers retains large stock interest in the company and will give to it the full benefit of his technical knowledge by serving as consulting engineer. This arrangement will permit him to devote more time to his foreign interests without injury to the American business. James C. McMath, vice president of the company, will continue in his present capacity. The offices will in the near future be removed to Pittsburgh.

Robert E. Baker and Donald D. Herr, business associates of Arthur G. McKee, Cleveland, during a number of years past, have joined with him in the incorporation of his engineering and contracting business under the name of Arthur G. McKee & Co.

Railroad Buying is Increasing

With Prospect of Much More Business Being Placed—Fair Activity in Rails and Rolling Stock

Philadelphia, Jan. 5.—Railroad buying has become an appreciably larger factor in the iron and steel market in this territory, and the indications are that it will continue to expand.

Rails show fair activity. A number of lines have bought, but the purchases have been very conservative in size. Several inquiries are pending and more are in sight, as other roads now are preparing their 1915 budgets. The Baltimore & Ohio railroad is figuring on about 30,000 tons and the inquiry for 40,000 tons for the New York Central system, which is in addition to the 30,000 tons recently purchased from the Lackawanna Steel Co., remains before the mills in this territory. The Reading has placed a partial order for 6,000 tons with two eastern mills and the Central Railroad of New Jersey also has distributed some tonnage. The Pennsylvania railroad is expected to put out its rail requirements in a few weeks, but the indications are the tonnage will be disappointing. The Queensland Railways, which recently inquired of American mills for 16,000 tons additional, have placed this order with British mills. One new export order for rails, however, has been placed with a Pennsylvania mill.

In cars the Baltimore & Ohio railroad has entered the market and is about to close for 2,000. Other roads are preparing specifications. The Pennsylvania railroad has taken bids on 10,000 tons of plain material for 1,000 steel box cars to be built at Altoona, as recently announced. The Baldwin Locomotive Works has taken 16 locomotives for a western road.

The Pennsylvania railroad announces officially that it will require 17,600 tons of riveted steel and 1,270 tons of concrete bars for bridge work now arranged for construction during 1915. The Baltimore & Ohio railroad has awarded 25,000 to 30,000 kegs of standard spikes for first half to the Jones & Laughlin Steel Co., and is still negotiating for its first half needs of plates, shapes and bars. The Seaboard Air Line asks 2,000 to 3,000 kegs of spikes. The Southern railway also is in the market for first quarter plates and shapes. The Pennsylvania railroad is taking figures on large requirements of nuts, bolts and rivets. Some contracts for bar iron are being placed by the railroads with eastern Pennsylvania mills.

Encouraged at Birmingham

Birmingham, Ala., Jan. 5.—Optimism has been injected into industrial circles by the announcement that the Louisville & Nashville Railroad Co. has placed an order with the Tennessee Coal, Iron & Railroad Co. for about 38,000 tons of rails for delivery during the first half.

While the order would mean but about three weeks' full operation at the local rail mills, it is considered of much greater value now than in normal times, both to the district, the Tennessee company and for its moral effect on business. Aside from meaning some excuse for the operation of the rail mill, it means that the Louisville & Nashville contemplates considerable improvement work, although the railroad company has not made public detailed information as to the use to be made of the rails.

Reports also are to the effect that other railroads are in the market for rails and prospects for a high percentage operation of the rail mills at Ensley are bright.

Inquiries for Four Thousand Cars

Chicago, Jan. 5.—Some indications of the intention of railroads to buy more freely is found in the fact that inquiries for about 4,000 cars are now before builders. The Illinois Central is seeking 1,000 refrigerator cars and an inquiry of the C., H. & D. Railroad Co. for 1,000 each of box and gondolas has been revived and smaller inquiries aggregating about 1,000 cars additional.

A contract has been closed by the Algoma Steel Corporation, Ltd., Sault Ste. Marie, Ont., with the Pere Marquette railroad, for 8,000 tons of rails. It is understood that the price made by the Canadian company was somewhat below the prevailing price in the United States for the same kind of rail.

The Lake Superior & Ishpeming Railway is in the market for 400 50-ton ore cars and it is expected that the order will be placed at an early date.

The Illinois Central is inquiring for 25 locomotives.

Greater Mill Activity

In the Pittsburgh District—Westinghouse Electric Enters Market for Pig Iron Requirements

Pittsburgh, Jan. 6. (By wire.)—The general tone of the market shows a continuation of the improvement noted at the beginning of the year. Specifications on finished products, including plates, shapes, bars, sheets and tin plate have increased in volume, enabling mills to increase operations to 50 per cent and above in this district. Hot rolled products appear firm at 1.10c, Pittsburgh, and so far as ascertained, there is nothing below.

Railroads and car builders are figuring in the market. Spike buying is heavy with standard selling at 1.35c.

The increased demand for finished materials has created activity in old materials. One important melter has taken upwards of 10,000 tons of heavy melting at $11.25, or 50 cents above the previous minimum. Some tonnages were sold recently at $11.50. An independent pipe maker has taken 65 miles of 4-inch steel pipe for southwestern shipment. Discounts are unchanged.

The McClintic-Marshall Co. has taken 800 tons for the Pittsburgh Plate Glass building, Clarksburg; 800 for Sylvian avenue bridge, Pittsburgh, and 2,500 tons for the Union Bank, Cleveland.

Pig iron is marking time. The Westinghouse Electric & Mfg. Co. entered today for requirements for the year for the plant at Allegheny, but has enough under contract for first quarter. The Westinghouse Machine Co. is still negotiating.

The basic average in December was $12.50, making the average for the year $12.854, which is $1.77 below the basic average for 1913 and $1.15 below the 1912 average.

Pig Iron Loss is 7,720,000 Tons

Output of Pig Iron for 1914 Shows Big Drop From Previous Year—December Production Small—More Stacks Active

The production of coke and anthracite pig iron in 1914 was 22,970,926 tons. Allowing for a production of charcoal iron of 260,000 tons, the country's output last year was 23,230,000 tons, a decline of 7,720,000 tons from 1913. December's output was 1,495,325 tons compared with 1,501,269 tons in November, a decline of 5,944 tons. December was easily the lowest month for production since the decline set in, early in 1913. Last month's production was the smallest of any month since September, 1908.

Last year's production of coke and anthracite pig iron showed a loss of 7,681,841 tons from 1913. The year's total was the lowest of any since 1908, when the production was only 15,700,000 tons.

The daily output of pig iron in December was 48,236 tons against 50,042 tons in November, a loss of 1,806 tons. This loss was due altogether to the non-merchant furnaces which produced 1,010,824 tons in December and 1,045,447 tons in November, a loss last month of 34,623 tons. The merchant furnaces show a gain in output for the first time in months, producing 463,217 tons in December and 432,943 tons in November, a gain of 30,274 tons.

There was an increase of four in the number of active stacks, 154 being in blast on the last day of December. This compares with 191 active on the last day of 1913 and 291 on Dec. 31, 1912. Five merchant and five non-merchant stacks were blown in during December and three merchant and three non-merchant stacks were blown out.

Merchant furnaces blown in during December were: One Detroit, Detroit Iron & Steel Co.; one Buffalo, Buffalo Union Furnace Co.; Hamilton, Hanging Rock Iron Co.; Cherry Valley, Penn Iron & Steel Co., Dec. 1; Blanche, Marting Iron & Steel Co., Dec. 24. Those blown out were: One Iroquois, Iroquois Iron Co., Dec. 4; Ashland No. 2, Ashland Iron & Mining Co., Dec. 29; Cranberry, Cranberry Furnace Co., Dec. 29.

Non-merchant furnaces blown in last month were: Minnequa "E," Colorado Fuel & Iron Co., Dec. 23; Gary No. 8, Indiana Steel Co., Dec. 9; one Ohio, Carnegie Steel Co., Dec. 30; one La Belle, La Belle Iron Works; one Aliquippa, Jones & Laughlin Steel Co. Those blown out were: Minnequa "D," Colorado Fuel & Iron Co., Dec. 22; Lorain No. 4, National Tube Co., Dec. 14; one Bethlehem, Bethlehem Steel Co.

There were five furnaces banked on the last day of the year, four of which, Hannah, one Shenango, Lynchburg and Clinton, have been banked since September. Crane No. 1, of the Empire Steel & Iron Co., was banked Dec. 13.

The accompanying tables show the average daily production of pig iron for the past three years, the total monthly output for the same period, monthly production of merchant and non-merchant pig iron during 1913 and 1914, the number of stacks active each month since January, 1907, and the December production figures.

AVERAGE DAILY PRODUCTION.

	1914.	1913.	1912.
January	60,624	89,929	66,220
February	67,450	92,095	72,372
March	75,534	89,123	77,791
April	75,383	91,812	79,254
May	67,646	90,865	80,753
June	63,486	87,229	81,125
July	63,075	82,525	77,502
August	64,403	81,839	80,650
September	62,757	83,137	81,482
October	57,007	81,933	86,569
November	50,042	74,322	87,985
December	48,236	63,746	89,590
Average	62,934	83,980	80,124

MONTHLY PRODUCTION.

	1914.	1913.	1912.
January	1,879,336	2,787,800	2,052,806
February	1,888,607	2,578,670	2,098,796
March	2,341,551	2,762,823	2,411,529
April	2,261,501	2,754,353	2,377,621
May	2,097,019	2,816,825	2,503,341
June	1,904,566	2,616,883	2,433,737
Total 1st half	12,372,580	16,317,354	13,877,830
July	1,955,324	2,558,275	2,402,567
August	1,996,483	2,537,018	2,500,163
September	1,882,718	2,494,098	2,444,454
October	1,767,227	2,539,924	2,683,645
November	1,501,269	2,229,960	2,639,562
December	1,495,325	1,976,138	2,777,292
Total 2d half	10,598,346	14,335,413	15,447,683
Grand total	22,970,926	30,652,767	29,325,513

ACTIVE STACKS ON LAST DAY OF MONTH FOR PAST EIGHT YEARS

	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.
Jan.	311	139	234	311	210	227	297	199
Feb.	308	150	233	311	226	235	306	219
Mar.	304	154	229	310	236	237	278	232
Apr.	327	146	224	291	220	239	297	212
May	329	145	236	279	206	243	285	198
June	341	154	240	271	202	242	283	193
July	335	166	258	254	196	245	264	187
Aug.	329	181	278	244	206	254	260	187
Sept.	328	189	297	234	216	262	258	180
Oct.	314	200	309	230	214	280	244	162
Nov.	226	212	311	218	214	289	225	150
Dec.	154	221	314	193	215	291	191	154
Av.	301	171	264	262	213	254	266	189

MERCHANT IRON OUTPUT

	1914.	1913.
January	628,662	774,208
February	572,145	748,496
March	659,514	821,333
April	609,783	762,770
May	620,891	786,131
June	556,826	716,751
July	538,341	675,883
August	504,544	659,363
September	468,177	638,134
October	455,068	673,698
November	432,943	645,503
December	463,217	668,938
Totals	6,510,111	8,571,208

NON-MERCHANT IRON OUTPUT.

January	1,227,156	1,994,363
February	1,302,620	1,808,430
March	1,657,720	1,917,750
April	1,629,234	1,965,575
May	1,454,624	2,008,852
June	1,331,486	1,876,320
July	1,400,462	1,859,177
August	1,480,362	1,856,975
September	1,399,890	1,828,882
October	1,292,751	1,843,753
November	1,045,447	1,558,702
December	1,010,824	1,290,705
Totals	16,232,576	21,809,484

DECEMBER PIG IRON

	No. of stacks.	No. in blast last day of month.		Total tonnage made.		Totals	
Stacks.		Dec.	Nov.	Merchant.	Non-Merchant.	Dec.	Nov.
Pennsylvania	157	64	64	112,828	524,267	637,095	653,975
Ohio	73	32	28	94,532	237,007	331,539	338,088
Alabama	45	16	16	108,605	35,158	143,763	136,710
Virginia	22	4	4	12,315	.....	12,315	12,929
New York	26	12	11	62,929	51,717	114,646	105,483
New Jersey	6	1	1	6,793	.....	6,793	6,910
Illinois	26	8	9	10,662	71,653	82,315	89,029
Colorado	6	2	2				
Indiana	10	4	3				
Maryland	4	1	1				
Wisconsin	6	2	2	14,450	84,098	98,548	92,546
Kentucky	7	1	2				
West Virginia	4	1	1				
Tennessee	18	4	5				
Washington	1	0	0	25,953	6,924	32,877	34,230
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	0	0				
Michigan	3	2	1				
Missouri	1	0	0	14,150	.....	14,150	8,490
Spiegel—All states...						10,297	10,293
Ferro—All states....						10,987	12,586
Totals	421	154	150	463,217	1,010,824	1,495,325	1,501,269

Foreign Inquiry for Pig

Germany and Italy Would Like to Buy in This Country —Basic Commands Attention in the East

Philadelphia, Jan. 5.—Basic iron has commanded the most attention in a continued fair market in pig iron in eastern Pennsylvania the past week. A Schuylkill valley works took 3,000 tons of early basic and a Reading buyer asks 1,000 tons of special basic. The Central Iron & Steel Co., Harrisburg, which has been operating irregularly and is about to increase its steel-making activities, also has opened negotiations for first half. The requirements are indefinite, but they will probably run not less than 10,000 to 15,000 tons. The eastern basic market remains at $13.50, delivered eastern Pennsylvania, but some makers are inclined to ask more.

Foundry and forge iron buying is of moderate extent. A Delaware River pipe maker took 2,000 tons and smaller sales of pipe iron also were made in the week. A soil pipe maker asks 1,000 tons and Virginia pipe works, which recently bought liberally, still are figuring with makers. The Southern railway bought about 400 tons of Alabama iron for January. Northern No. 2X is unchanged at $14.25 to $14.50, Philadelphia. Pipe forge is $13.25 to $13.50, delivered this territory.

Germany has inquired of eastern makers for 1,000 to 2,000 tons of low phosphorus or hematite iron running 0.05 in phosphorus. Similar inquiries have been coming out of Italy, one of them being for 10,000 tons. Eastern makers have done nothing with these inquiries. Domestic buying of low phosphorus holds up. Sales of standard iron in the mills reached 1,500 to 1,800 tons. A recent sale of 3,000 tons was made by a Lebanon maker. The Delaware river furnace which recently took up the manufacture of low phosphorus has switches to bessemer and other grades. The Everett, Pa., furnace will blow in within ten days on foundry.

New Jersey Inquiry

New York, Jan. 6. (By wire.)—One Elizabethport, N. J., consumer asks for 2,000 tons of Nos. 1 and 2 plain for first half. Otherwise the iron market is dull.

Carnegie Banquet.—Operating officials of the Carnegie Steel Co., Pittsburgh, held their annual banquet Jan. 2 at the Hotel Schenley, that city. Col. Henry P. Bope, vice president and general manager of sales, was toastmaster. Talks were given by Col. Bope, A. C. Dinkey, William G. Clyde, James R. Reed and John S. Unger. James A. Farrell, president of the United States Steel Corporation was guest of honor.

Large Gains

Made in Bookings by Steel Companies —Rail Orders

New York, Jan. 5. (By wire.)—The unfilled tonnage of the United States Steel Corporation for December will show an increase of at least 300,000 tons and it may reach 400,000. Large independents have also booked largely increased tonnages in December over November. Some of them report gains of more than 100 per cent. Operations tend toward a slight increase. The Corporation is now running 40 per cent against 28 at the close of the year. Makers show a general determination to hold for the 1.10c minimum for either prompt or first quarter. A number of contracts for first quarter have been closed at 1.10c. Some forward tonnages offered at 1.05c have been refused.

There are conflicting reports as to the size of the Pennsylvania rail order soon to come out. Estimates range from 60,000 to 200,000 tons. The best advice is that the order will be conservative. The Lackawanna Steel Co. takes the Boston & Albany order for 4,500 tons of rails. The Reading gives the Corporation 1,500 in addition to 6,000 to two eastern mills and still negotiates. The Baltimore & Ohio has given preliminary orders for 4,000 tons, including 2,500 tons to the Carnegie Steel Co., but still figures on about 30,000. The Lehigh & New England has released 1,000 tons to the Bethlehem Steel Co.

Can Pipe Award

Chicago, Jan. 5.—The United States Cast Iron Pipe & Foundry Co. has been awarded 2,400 tons of 36-inch pipe by the city of Cincinnati and the same city will open bids Jan. 6 for 1,000 tons additional of the same size.

The bi-monthly examination of bar iron sales sheets of selected mills will be made about Jan. 10 at Youngstown by the Amalgamated Association of Iron, Steel and Tin Workers and the Western Bar Iron Association, to determine puddlers' wages at mills operating under the Amalgamated schedule. The settlement will effect wages in January and February.

Furnace Coke

For First Half Purchased by the Reading Iron Co.

Philadelphia, Jan. 5.—The Reading Iron Co. has purchased 10,000 to 12,000 tons monthly of Connellsville furnace coke to cover the requirements of its Keystone stack, for the first half. The contract was placed at somewhat below the usual first half market, but it is understood the seller is allowed some lattitude in the analysis of shipments.

Eight Vessels

Ordered in the East During the Past Month

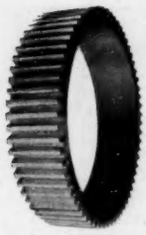
New York, Jan. 6. (By wire.)—The contract for another ocean-going vessel has been closed with eastern yards requiring about 3,500 tons. This makes eight boats closed the past month. France inquires for 100 locomotives and Servia 20. It develops that of the additional vessel contracts recently taken by the Maryland Steel Co., as previously reported, one is for the Munson line and the other for the A. H. Bull Steamship Co.

Pig Iron Prices

PIG IRON.

(First half delivery.)

Bessemer, valley	$ 13.75
Bessemer, Pittsburgh	14.70
Basic, Pittsburgh	13.45
Basic, eastern Pa.	13.50
Malleable, Pittsburgh	13.70 to 14.45
Malleable, Chicago	13.00 to 13.25
Malleable, Philadelphia	14.50 to 15.00
Malleable, Buffalo	13.00 to 13.25
No. 1X, Philadelphia	14.50 to 14.75
No. 2 foundry, Pittsburgh	13.70 to 14.45
No. 2 foundry, valley	13.00 to 13.50
No. 2 foundry, Cleveland	13.25
No. 2 foundry, Ironton	12.75
No. 2 foundry, Chicago	13.00 to 13.25
No. 2X foundry, Philadelphia	14.25 to 14.50
No. 2X fdy., (N. J. tidewater)	14.25 to 14.70
No. 2X foundry, Buffalo	13.00 to 13.25
No. 2 plain, Philadelphia	14.00 to 14.25
No. 2 plain, (N. J. tidewater)	13.75 to 14.00
No. 2 plain, Buffalo	12.75 to 13.00
No. 2 southern, Birmingham	9.50 to 10.00
No. 2 southern, Cincinnati	12.40 to 12.90
No. 2 southern, Chicago	13.50 to 14.00
No. 2 southern, Phila. delivery	14.50
No. 2 southern, Cleveland	13.50 to 14.00
No. 2 south'n, New York, docks	14.00 to 14.25
No. 2 southern Boston, docks	14.00 to 14.25
No. 2 south'n, interior New Eng.	15.00 to 16.00
No. 2 southern, St. Louis	14.00 to 14.25
Virginia No. 2X furnace	12.50 to 12.75
Virginia 2X, Philadelphia	15.00 to 15.25
Virginia 2X, Jersey City	15.25 to 15.50
Virginia 2X, Boston points	15.50 to 15.75
Gray forge, (eastern Pa.)	13.50 to 13.75
Gray forge, Pittsburgh	13.45 to 13.70
Gray forge, Birmingham	8.75 to 9.00
Silveries, 8 per cent, Cleveland	17.63
Silveries, 5 per cent, Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	19.00 to 20.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.70 to 20.95
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.50
Charcoal, Buffalo	15.75 to 16.75
Charcoal, Birmingham	25.00



Steel Mill Castings

Some Facts Regarding the Use of Manganese Steel in Heavy Rolling Mill Equipment

BY GEORGE TRIPP

NOTWITHSTANDING the comparatively small amount of publicity the subject of manganese steel has been given up to date in our country's trade journals, it represents a most important factor in reducing the cost of maintenance in and about mills and furnace plants. It will not be the purpose of this article to go into detail so far as the manufacture of manganese steel castings is concerned, but merely to furnish the reader with information pertaining to the progress that has been made during the past three years in the utilization of this material in steel mill machinery and equipment.

Manganese steel castings were successfully made in the United States about 20 years ago but only on a small scale. The light service imposed upon rolling mill machinery at that time made it possible to use even gray iron castings for wearing parts in such equipment and it was not until the demand required greater tonnage from the mills that castings possessing more strength and better wearing qualities were sought. Carbon steel was then resorted to and used exclusively until the gradually increasing demand for billets, rods, structural material and sheets created a necessity for still heavier machinery. Each succeeding mill was built on more and more substantial lines in order to withstand the heavy duty imposed. It developed that it was possible to increase the sections throughout the construction of the mill to a point where the metal would withstand the terrific strains imposed upon the static portions of the machinery, but the wearing parts, such as crane wheels, table gears, pinions, etc., began to show evidence of weakness.

As the zenith of perfection had been reached in the quality of steel castings used in the construction of the machinery without meeting the heavy duty requirements of today it became necessary to develop some new metal as a substitute in order to reduce the high cost per ton of steel rolled, occasioned by break downs and replacements due, in the majority of cases to a broken or worn out casting. Heat-treated and alloy steels were experimented with and several grades are now being used. Continued experiments with heat-treated castings has brought out two distinct features. As a direct result of heat treating, high strains and stresses are set up in the casting, giving it a much higher tensile strength and rendering the surface more resistant to abrasion.

FIG. 1 — MANGANESE STEEL SLEEVE GEAR FOR A UNIVERSAL MILL

Breakages due to sudden shocks were frequent in this class of casting and while it proved far superior to the ordinary steel casting, a steel was sought that would have good wearing quality and at the same time be able to withstand heavy shocks. Another type of casting was tried and is still being used in places where only wear is encountered.

This style of casting is made by treating certain surfaces of the mold with a silica wash impregnated with a quantity of powdered manganese and then pouring the mold with the ordinary liquid steel that is used in standard steel castings. Castings of this type acquire a veneer of manganese and wear well so long as this surface is present but are no stronger than ordinary steel castings.

Manganese Castings for Rolling Mills

The brutal resisting quality of standard manganese steel castings had for some time been appreciated by executives in the ceramic industries, by users of racks, pinions and teeth on steam shovels and dredges, in crushing machinery and railroad work. It was not, however, until about four years ago, that a systematic exploitation of the steel industries was commenced by the companies making manganese steel. The illustrations presented herewith indicate the character of castings now being used extensively. In a crane wheel where uniform diameters must be maintained on the drives to insure straight alignment in travel, manganese steel has been found to be an ideal material and crane builders are now being required to furnish wheels of this material. Fig. 2 shows double flanged crane wheels that for two years have been carrying a 90,000-pound rolling load per wheel. At a recent inspection of these wheels the flanges, which naturally travel through a greater distance than the tread, exhibited but slight indications of wear, notwithstanding the constant grinding on the sides of the rail. This feature alone is worthy of consideration in view of the fact that derailments on curves are usually caused by the flanges having worn to the angle of least frictional resistance, allowing the inherent straight line force to push the wheel flange up over the rail. Another advantage that

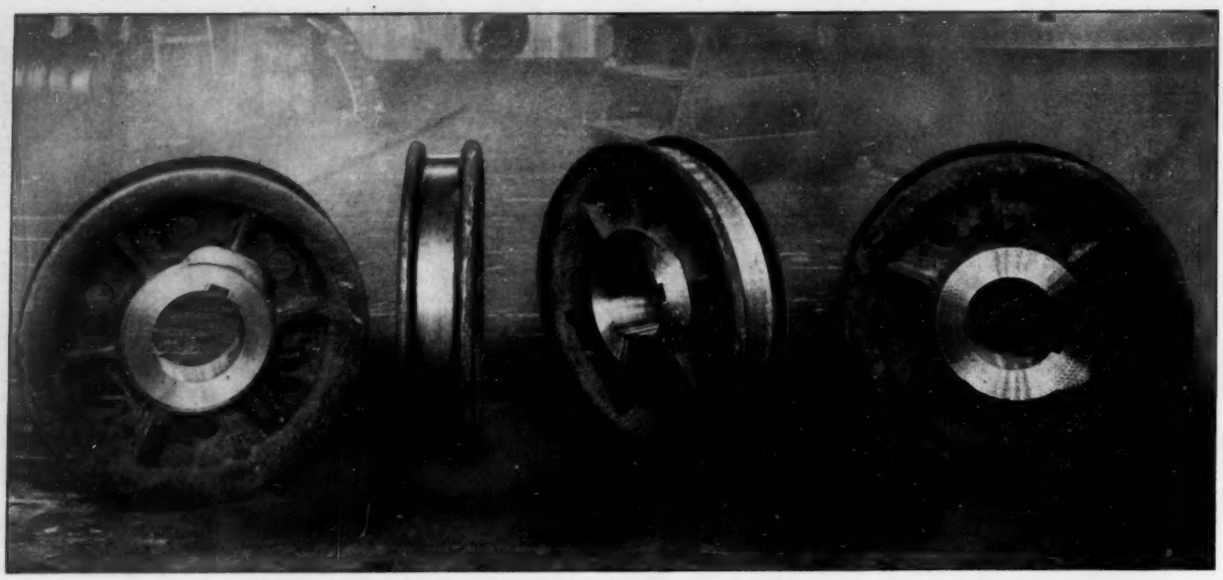


FIG. 2—DOUBLE FLANGED MANGANESE STEEL CRANE WHEELS CARRYING 90,000-POUND ROLLING LOAD

crane wheels made of manganese steel have, especially under very heavy loads, is due to the resilience of the metal giving to the tread a greater contact area.

The average analysis of a good manganese steel casting should be as follows:

	Per cent.
Manganese	12.50
Carbon	1.25
Silicon	0.30
Sulphur less than	0.02
Phosphorus about	0.08

A microscope examination of a manganese steel wheel under load will show a flat spot instead of a line contact as is the case in hard metal wheels. Manganese under these conditions is springy and recoils as the load is released. The writer is keeping a close record on several wheels that are being operated under heavy static and rolling loads. About 30,000 pounds has always been considered a safe working load on chilled iron wheels for this purpose and if the wheels mentioned above continue to carry 90,000 pounds each throughout their life many interesting deductions can be made.

Mill table gears form a large proportion of the manganese castings used in the steel industry because it has been demonstrated that a great saving in cost is effected by installing this class of gear on mill roller shafts. Many cases could be cited where this grade of gear has not only earned its invoice price but has outworn carbon steel gears ten to one and I have yet to hear of a case where a tooth has broken out of a bevel table gear in such service.

In universal plate mills, manganese has taken the place of carbon steel in the sleeve gears. After two years of service in a mill that could not be long operated with carbon gears a set of manganese gears shows so little wear on the teeth that a continued life of many years can reasonably be expected.

Two of the accompanying illustrations, Figs. 5 and 6, show very heavy spindles and coupling boxes. Great quantities of these are already in service and from a wearing standpoint these castings are said to be all that is required. One pleasing discovery has resulted in assurance that a manganese steel coupling box will not score a carbon steel roll spud. This was feared for a long time until a trial was made with satisfactory results.

Bell rod sleeve protectors, small bells and hoppers, and furnace chute plates of cast manganese steel are in service

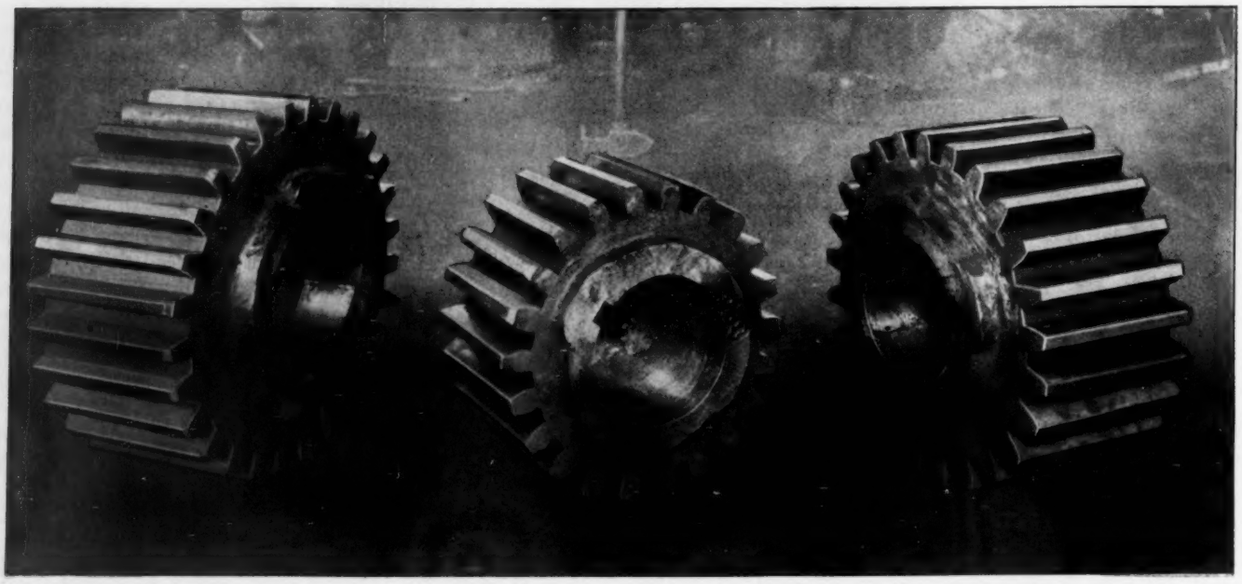


FIG. 3—ROD MILL NEST GEARS WITH TEETH GROUND THEORETICALLY CORRECT

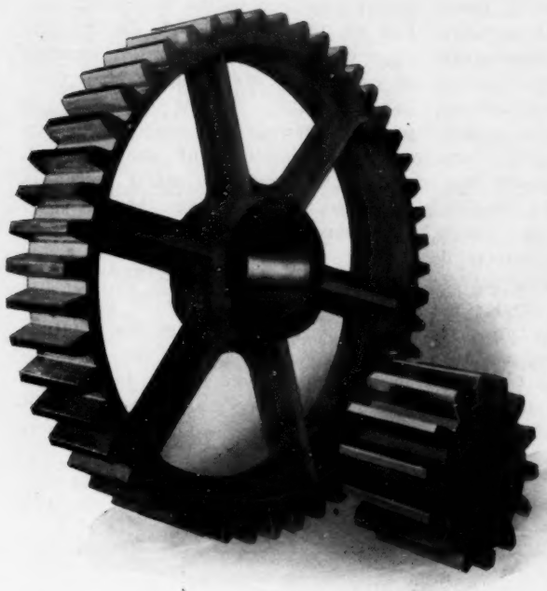


Fig. 4—Gear and Pinion With Ground Teeth

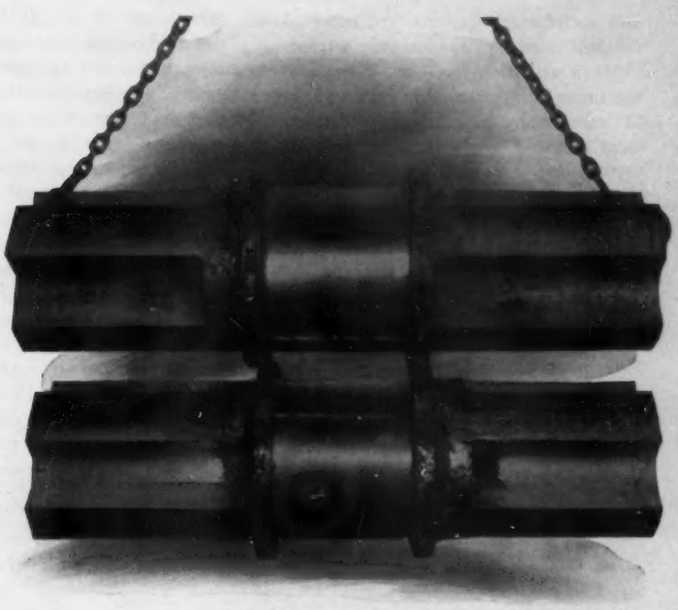


Fig. 5—Blooming Mill Spindles

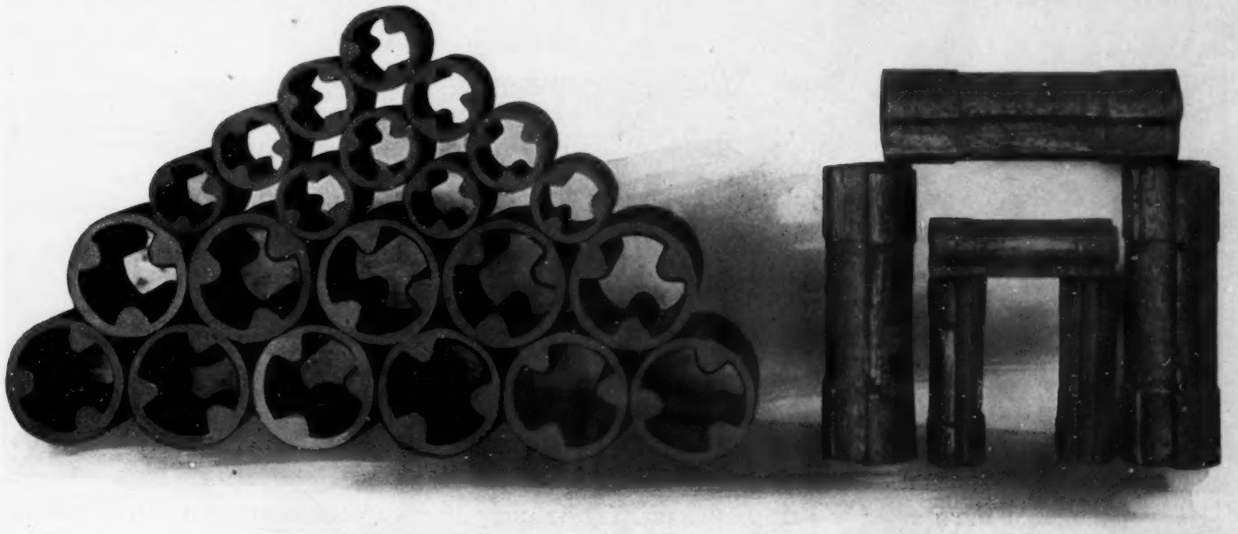


Fig. 6—Manganese Steel Coupling Boxes and Spindles

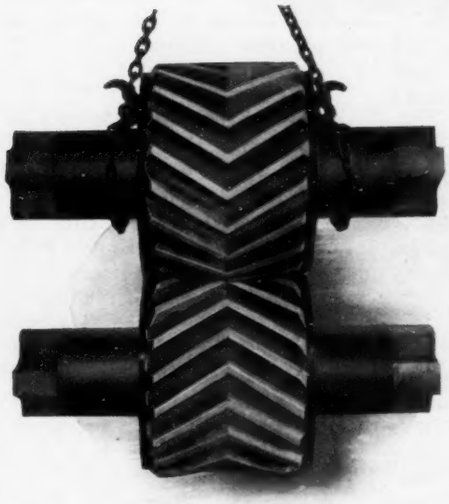


Fig. 7—Herringbone 48-inch Mill Pinions With Necks and Pinion Cast Integrally

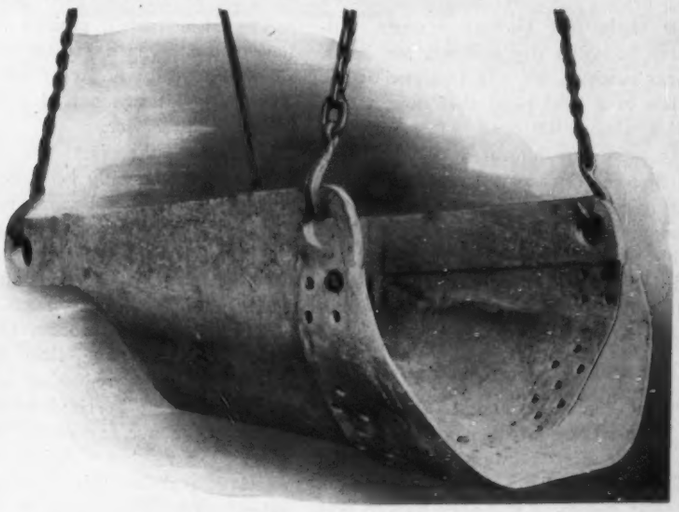


Fig. 8—Cast Manganese Tray For 10-Ton Clamshell Bucket

and satisfactory reports are received as to their adaptability for this purpose.

Much attention has been given also to the lining of furnace skip cars and chutes of cast manganese steel, and the results obtained are gratifying, indeed. A set of skip car plates that has been in use for four years shows less than ⅛-inch wear on the bottom plates. This same skip car was also provided with manganese steel wheels and the treads still maintain their original shape.

Used in Ore Handling Plants

Most all ore handling plants are using cast nose pieces of manganese steel on their buckets and several have adopted an entire tray with a detachable lip, as their standard. Many other machine parts about steel mills are now being made in manganese steel, such as pipe

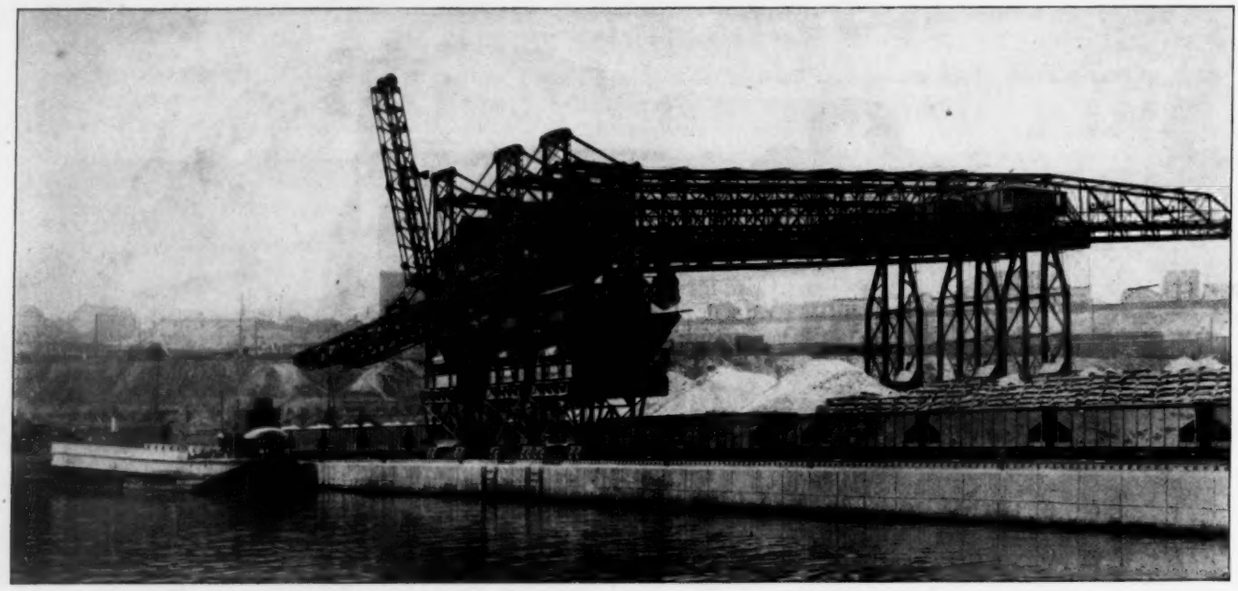


FIG. 9—UNLOADING MACHINE AT CENTRAL FURNACE, CLEVELAND, EQUIPPED WITH MANGANESE STEEL WHEELS

drawing balls, chafing plates, sprockets, cams, draw chains, unloader chains, conveyor chain and buckets, screens, pulverizer hammers, dry and wet pan parts, crusher castings, etc. In fact one of the officials in a steel plant that now has in service about 500 tons of manganese steel castings, volunteered the information that the replacement of carbon steel wearing plates with manganese steel castings was beginning to show its effect on his plant steel foundry that was intended as a means of supplying repair parts and spare castings needed throughout the works.

Difficulties in Making Pinions

One of the most intricate problems in the manufacture of manganese castings was encountered in making mill pinions. An order for a set of 52-inch reversing blooming mill shell pinions was taken by the writer with but a faint knowledge of the multiplicity of foundry difficulties that would of necessity have to be met in making a satisfactory casting of this size and weight. Up to the time this order was taken castings weighing only a few hundred pounds each were being made and as these pinions were to weigh over seven tons each when finished, some idea may be formed as to the difficulties and disappointments incident to the successful making of a casting of this kind out of a metal as strange in its behavior as special converter liquid steel properly alloyed with 80 per cent ferro-manganese had proved to be. How successfully this type of casting has been produced can be stated tersely by reference to Fig. 7 showing a set of herringbone mill pinions with necks and wabblers cast integrally with the pinion. These castings have already rolled nearly 300,000 tons with no appreciable wear on the teeth.

The 52-inch shell pinions referred to have rolled a much greater tonnage and show practically no wear on the teeth. These are but two out of a great many sets now in service.

Owing to the fact that cast manganese steel can only be treated up to a certain thickness it became necessary to core out the castings on the inside, leaving as uniform a thickness throughout the casting as the outer contour would admit.

The coring out process results in a much lighter casting than if it were made solid. The reduction in weight in the case of the herringbone pinions referred to above, amounted to a little over 20 per cent. Aside from their wearing qualities this feature in manganese steel pinions must be appreciated by mill operators on account of a lighter load per square inch being carried on the journals. A decided difference also can be noticed in starting and stopping a mill equipped with these light castings. If the difference in power required to attain maximum speed be considered of small account, perhaps an advantage might accrue in the time saved during the cycle of operations.

Less Grease Required

Another point in favor of manganese steel gears laboring under heavy torque is that on account of the low coefficient in friction it has been found possible to reduce materially the quantity of grease used. One of the users of a set of 44-inch blooming mill pinions is lubricating the teeth partly with water. In considering the elastic limit in a manganese mill pinion—and as a matter of fact that is the only point to consider outside of its wearing quality—I offer the following.

Test of 35-inch Pinions

A physical test was made on a set of 35-inch pinions. The mill was operating normally when a piece of bar iron ⅞ x 3 x 5 inches in some way fell into the teeth stalling the mill. After jacking back the gears it was found that the piece had taken the form of the gear tooth and space but not a mark was discovered on the teeth. The castings must have sprung in the necks but did not leave a permanent set, having recoiled to their normal shape, and ran true when operation was resumed.

It may be interesting to some readers to learn that for the past two years manganese steel spur gears have been made with teeth ground theoretically

correct. In a set of nest gears for a continuous mill, the teeth on both pinions and gears are cut with a range cutter leaving the rolling contact not theoretically correct, whereas in grinding manganese steel gears a trimming arrangement is placed on the grinder for the purpose of dressing the emery wheel to the proper contour of the tooth space so that when the mating gears are meshed each tooth is provided with a perfect contour on which to roll. Fig. 3 shows a set of high speed heavy nest gears put into service July 5, 1912. The forged steel gears previously used had a 12-inch face. On account of greater strength in cast manganese steel, the face of the gears was cut down to 10 inches and the circular pitch was reduced. When the gears were installed the tooth measurement at the pitch line was 0.684-inch. After a little over two years' continuous wear, the teeth were measured again on July 19, 1914, and the tooth measured 0.601, having worn less than 0.01-inch. They are still in service after having more than earned their original cost and will be good for many years to come, barring accident. One of the new steel plants recently installed a full set of ground gears of a very heavy type on a main drive.

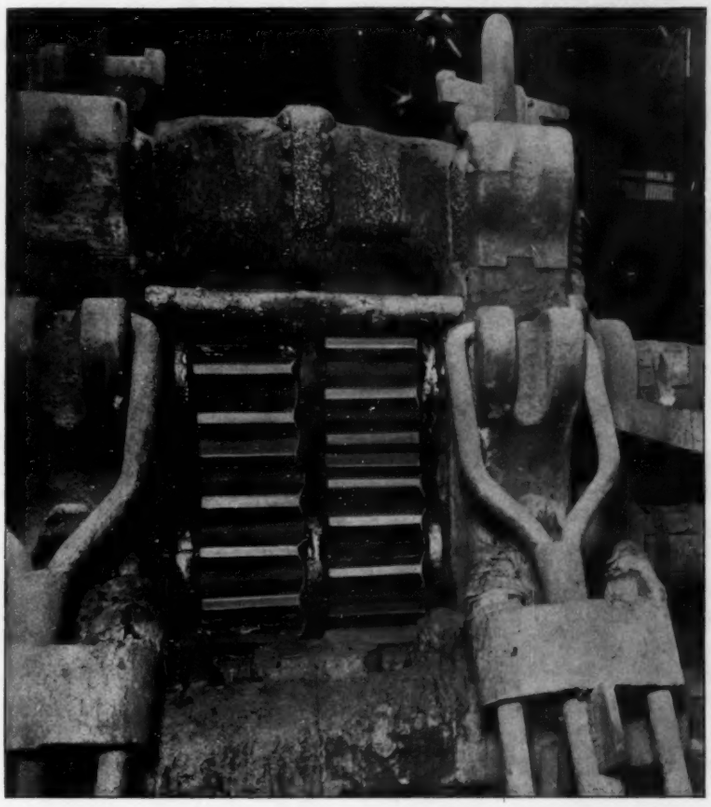


FIG. 10—STAGGERED TOOTH, 35-INCH MANGANESE STEEL PINIONS IN SERVICE ON A 40-INCH REVERSING BLOOMING MILL

Westinghouse Relief Plan

The Westinghouse Electric & Mfg. Co. has issued a preliminary statement of its sickness and accident relief, accident compensation and service pensions on which its officers have been working for over a year. The plan includes three separate and distinct features: Extension of the present relief department; an accident and compensation plan, and service pensions. The privileges of the relief department are open to every employe, male or female, regardless of age, position or location, upon payment of small monthly dues.

Details of Plan

The company pays the entire expense connected with the operation and maintenance of this department, the dues being reserved wholly for the payment of benefits (proportioned to wages) for sickness and accident arising from causes other than employment. In the event of death the amount paid from the dues will be duplicated by the company which will also meet any deficit that may arise. Benefits will continue as long as disability lasts, or until the age of 70 years is reached, when pensions will then be granted.

An accident compensation fund is maintained entirely by the company for the benefit of all employes, male or female, whether they belong to the relief department or not. This plan covers the payment for disability due to accident, or for death resulting from accident, while at work as an employe and makes provision for both total and partial disability.

This plan covers the payment for disability due to accident, or for death resulting from accident, while at work as an employe and makes provision for both total and partial disability. In case of total disability the company will pay as long as the disability lasts, even for life, two-thirds of the average wages received, and for partial disability, two-thirds of the reduction in the earning capacity of the employe, even though the employe should eventually leave the service of the company. In case of death, the company will immediately pay the dependents, or next of kin $150, as explained under the provisions of the plan, as a pension to the widow or dependent husband or children under 16 years of age.

Medical, surgical and hospital expenses under the direction of the company's medical officers will be pair during the period of disability from such accidents.

Service Pensions

Employes of the company shall be retired at the age of 70 years, and those who at the time of such retirement are members of the relief department, and have completed at least 20 years of continuous service are to be granted a pension amounting to 1 per cent of the average monthly wages during the last 10 years of employment for every year of continuous service, with a minimum of $20 per month and a maximum of $100 per month. Upon the death of the pensioner, one-half of the pension will be paid to the widow until remarriage, providing marriage occurred at least 10 years before the granting of the pension. For the support of each child under 16 years of age, and for each wholly dependent grandchild under 16 years of age, one-fourth of the pension will be paid until they reach the age of 16 years. The president of the company may, at his discretion, retire any employe between the ages of 60 and 70 years who has been in the service the required time, and he may increase any pension for specially meritorious service, by 25 per cent, but not beyond the maximum pension of $100 per month.

In those states already having workmen's compensation laws, as in the case of New Jersey and Ohio, where the company also maintains plants, such laws may be substituted in whole or in part. Where the provisions of the Westinghouse plan are more liberal these will generally prevail.

The rapid heating of a bearing is a danger sign. If a bearing takes two or three hours to reach a temperature uncomfortably hot for the hand, it is probably safe, but if that same temperature is reached in 10 or 15 minutes there is likely to be trouble.

A Survey of Events in England

Effects of the Great War on Iron and Steel

Countless Difficulties Encountered—Radical Changes in Trade With America and Other Nations—Comparison of Billet Prices in United States and the Kingdom—Some Failures of Associations

BY JOSEPH HORTON

THE great European war must for all time place the year 1914 in a category by itself. It has been a year of tremendous vicissitudes, and in view of the hair-raising threats and alarms which followed the outbreak of the war, when almost anything seemed possible, British steelmakers ought, no doubt, to be grateful that the close of the year finds them still in possession of a fairly active and not altogether unprofitable trade. They, at all events, have escaped the hard fate of some Belgian competitors, whose expensive, modern and up-to-date plants have undergone partial or total demolition. Fluctuations, of course, there have been, and during the latter half of the year the position of the market has been singularly difficult either to diagnose or to forecast. But we are hoping that the worst is now past, and manufacturers are inclined to take a fairly optimistic view of the future.

The trade has had nearly every kind of difficulty, arising from erratic demands, labor shortage, shipping dangers, holding up or prohibition of materials, and financial stress, which have imposed the severest tax upon the management and proprietary interests. While the trade has risen to the occasion, our captains of industry would be the first to acknowledge their indebtedness to the sleepless vigilance of the British navy, which has saved from serious interruption our oversea business.

One of the curious effects of the war has been a practical reversal of the position in relation to America. A year ago, Great Britain was looking out keenly for opportunities to send its steel to America, under the new and easier tariff conditions. Now, the keenness to sell is on the American side, while large numbers of British consumers would welcome substantial shipments of American material, on terms successfully competing with metal turned out by the home mills. Sufficient has been done in this direction to suggest that American importations may very well prove to be, for the first time for a number of years, a noteworthy feature of the steel business of 1915.

The most interesting effect of the war from the British manufacturers' point of view has been the complete shutting off of continental supplies, giving to the home maker, without any sort of fiscal assistance, a practical monopoly, during the latter half of the year, of British markets. He already understands, however, that American competition will have to be reckoned with in the overseas market, and the opening encounters between the two great English-speaking peoples have induced a spirit of caution and modesty in the regulation of British prices.

In the pig iron department it is remarkable that, so far as Cleveland iron is concerned, fluctuations have been in no way comparable with those of the previous year, when something like a fall of $4.86 per ton had to be recorded. The year 1914 commenced with Cleveland warrants at $12.15 with a premium of 24c on forward business. That figure was maintained, with remarkably little variation, during the early months. In the middle of March, the figure was $12.20, having scarcely varied in the meantime. Then there was a little improvement raising the selling price to $12.40 during April, which was maintained during May, and, with very slight fluctuations, until July. The outbreak of war, of course, brought considerable disturbance, with the result that by the middle of August warrants were selling at $12.85. By September, however, there was a reversion to $12.40 and since then there has been a steady downward movement until by the end of November warrants were selling at $11.90 with a prevalent downward tendency. It is remarkable that pig irons elsewhere have been subject to much more violent fluctuations. This is especially true of the brands produced in Nottingham and Derbyshire, which find their market chiefly in the Midlands, and especially in the Birmingham district, where for years European sellers of iron and steel have found a very useful market. The outbreak of war was followed by an excited boom which sent Midland pig iron prices up with a bound. It was thought by expert buyers at the time that this was largely mere inflation, because in July, just before the war, the position was so dull that several furnaces were blown out. Apparently, makers formed an exaggerated idea of the effects to be expected from the withdrawal of foreign competition, and buyers, taking fright, assisted to force up prices from $1.20 to $1.95 per ton over pre-war rates. The reaction has accordingly been all the more violent, and it seems very likely that the decided downward movement now in progress will continue for some time.

The pig iron industry in the early months of the year showed some peculiar features. Apparently, the export business was then at its best, and a large business was done with the continent, while some exporting merchants had the very unusual experience of sending some consignments of pig iron to America. This was effected in spite of the extraordinary keenness of continental competition; it appears to be agreed that the fight of the Germans and Belgians

for the world's business, and especially for the supply of the British market, was never keener than during the late spring and early summer.

Probably, the backbone of the raw material department was the excellent demand for foundry iron due to a solid and extensive engineering activity. This was partly attributable to the great ship building demand, which persisted well after the actual outbreak of war, and in fact has still considerable strength. One of the topsy-turvy developments has been that foundry iron is now the least called for of any description, while forge iron has taken the lead for such demand as exists.

The Cleveland market may be said to have had a monopoly of ill-luck in the effects of the war, because its export trade is solely dependent on North Sea shipments, and the vigilance of the fleet has not prevented that area from being the most dangerous part of the world for all kinds of peaceful traffic. This is doubtless accountable for the fact that while Cleveland stocks were steadily reduced from the beginning of the year until July, when the amount totaled 78,000 tons, they have since undergone an increase, in spite of a considerable reduction of output. Whatever animation was felt in the early days of August spent itself much sooner in that district than elsewhere. It is significant that every mishap in the North Sea, whether to ships of war or commercial vessels, has been immediately followed by a restriction in the exportation of pig iron.

Prices of Steel Making Pig

It is rather curious that while the effect of the war has been to set up an enormous demand for steel, prices of steel making irons in the autumn were no better than in the spring of the year. In November the selling figure for East Coast mixed numbers was $15, which is practically identical with the prices prevailing during the first three months. Many people expected a better result from the shutting off of continental competition. The explanation seems to be the loss of general trade, which has more than counterbalanced the special war demand. The Barrow market has done slightly better than that of the northeast district, mainly because Barrow has been almost wholly devoted to the building of warships throughout the whole period. It should be added that conditions in the earlier part of the year were not quite normal, as a serious coal strike in Yorkshire compelled many works to cease operations. Stocks in the Barrow district have been low throughout the year, not only on account of large consumption, but from a resolute restriction of output to absolute necessities.

In the fuel department, as in other directions, war expectations have been disappointing. The large drafts of men from the collieries into the ranks led to predictions of fuel scarcity and high prices, and for a few weeks these were realized. But North Sea dangers have caused a tremendous shrinkage of coal exports, and coke, like nearly everything else, is plentiful, and on the down grade.

Reduction of Wages

In the finished steel department, the wages board returns have shown a fairly steady diminution, carrying with them, in accordance with the sliding

JOSEPH HORTON

scale arrangements, substantial reductions in wages. The reports for the 17 works representing the output under the Midland Iron and Steel Wages Board show that during November and December of 1913, published at the end of January, the average net selling price was $36.50 per ton. For January and February, the figure was reduced to $35, March and April $36.65, May and June $32.55. The slight recovery in the next two months was doubtless due to war excitement as the return for the months of July and August showed an average net price of $33.05.

The returns for September and October showed a net selling average of $35.45 per ton.

The substantial increase shown in the September and October returns gave the puddlers a rise of 12c per ton making the rate $2.40 per ton and mill and forge men 5 per cent advance. It will be seen therefore that Midland wages are restored to the rates prevailing a year ago.

But the complete change in conditions in the month of August fairly nonplussed even the most experienced members of the trade. The Midland district is a great user of steel, especially of basic skelp for tube-making, and of wire rods for the production of wire. Wire, it should be stated, is one of the staple products of Birmingham, and locally is consumed in large quantities by the nail and screw makers, as well as by the producers of wire netting, barbed wire, etc. The Birmingham district is also a great producer of nuts and bolts, rivets, washers, etc., and the lock trade of the Black Country with certain branches of the chain trade have all been large users of foreign steel. On the outbreak of war, they found these continental supplies cut off at a stroke, and a brisk demand consequently sprang up for Staffordshire iron, the effect of which was to involve a general rise of about $4.86 per ton in several descriptions. The price of skelp at once advanced from $30.30 to $35.20 per ton, and unmarked bars shortly afterwards followed suit with a somewhat similar advance. The makers of best bars simultaneously put up their prices $2.40, making the selling figure $43.70 a ton, with $3 extra for Lord Dudley's brand. At that time, it was expected that a further advance would follow in marked iron, but the close of the year finds that figure still unchanged, with little probability of fluctuation. Unmarked bars took a further rise to $38.80, the extent of the inflation being about $7.30 per ton. The descent was almost equally speedy, as makers very soon found that, outside of war business, there would be very little to occupy their mills. None of these figures have been maintained, and it is quite possible that the new year will see further reductions. Fortunately for the trade, the government has been a very good buyer for war purposes, but the practical extinction of export demand for Midland iron has very nearly counterbalanced the stimulating effect of the war.

Violent Fluctuations

Galvanized sheets have fluctuated with exceptional violence owing to the introduction of an additional element of complication, namely, the supply of spelter. At the beginning of the year, galvanized sheets were selling at $55.20, f. o. b. Liverpool. The trade at that time had fortified itself by the formation of an association

which, profiting by somewhat painful experience, had decided not to meddle with prices, but to make some serious effort to control output. The above price was maintained through February, but by July the selling figure had declined to $52.25, and there was fairly keen competition for business. Then came the outbreak of war; the government, in view of the requirements of brass and other alloys for ammunition, laid resolute hands upon all the spelter in the kingdom, with the result that sheet buyers gave way to some panic and prices ran up quickly, until some sheets in September were sold as high as $73 a ton. Then, apparently, the law of supply and demand reasserted itself, spelter began to flow in, while, on the other hand, the tremendous arrest of business in such markets as South America and the West Indies, resulting from the diversion of money into war channels, began to be felt. Prices have fallen even more quickly than they advanced. In the middle of November, sheets could be bought as low as $55.85, representing probably a record reduction, and apparently, nothing can prevent a still more serious fall. The outlook for that trade is anything but cheerful.

The Heavy Steel Trade

To the British heavy steel trade, the conditions introduced by the war, especially in Glasgow and Sheffield, have been almost revolutionary. During the early months of the year, trade was carried on with the greatest difficulty. The fierce competition of Germany in the supply of ship plates to the Clyde had compelled the Scotch steel makers to sever their connection with the British Steelmakers' Association, to enable them to compete with a free hand. The result was that plates were being produced in Scotland very close to the profit line, and foreign competition was still extremely difficult to meet. English steel was obliged to follow suit to some extent, and prices were, therefore, during the spring falling rather sharply. It will be remembered that in the latter half of 1913 Scotch plates were reduced $9.75 per ton. At the beginning of the year there was a little recovery of continental business, which gave a brief fillip to British trade, and enabled British billets in Birmingham to be advanced from $23.10 to $23.70. Apparently, this stimulated buying, and led to some good orders being placed both in England and Scotland. The makers of thin steel plates in South Wales were able to raise their quotations $1.21 per ton, but even at that time finished Belgian bars were being sent into Birmingham at $29.27 a ton. At the end of March, depression had once more set in, and during the next three months the amount of Belgian and German material dumped in caused consternation to British makers. There would have been a very heavy slump in prices, but for the large quantities of steel which were bought for bridges and ship building. At the July quarterly meeting, there were signs that the continentals were preparing for a sweeping descent on the British market. At that time, foreign billets were on offer delivered in Birmingham at $21.75, as compared with the British price of $23.10, while Belgian finished bars could be bought at $25.50. At that time, of course, war was not dreamed of, and those buyers who invested in a few thousand tons of these billets have been congratulating themselves ever since. Some people claim to have bought foreign billets at $20.65, delivered in Birmingham. There was, however, a pretty strong determination to meet this competition, and, it was stated, on apparently good authority, that many British firms were prepared to accept $21.80 for billets.

Joseph Horton

Mr. Horton was born in 1860, *in Wednesbury, in the heart of the Black Country, the son of John Horton, foreman hammer man of the Monway Steel Works. He was educated at the Wesleyan school, and after being employed for a number of years in local iron, steel and tube plants, became a newspaper man. From* 1888 *to* 1896, *he was editor of the Labor Tribune, organ of the miners and iron workers. From* 1896 *to* 1902, *he was a member of the staff of the Birmingham Daily Argus. He then became a free-lance journalist, specializing on trade matters, and especially on iron and steel. For the past ten years, he has represented* THE IRON TRADE REVIEW *in England. He is an ex vice president of the National Institute of Journalists.*

At midsummer the association controversy was still raging below the Tweed. The sweeping Scotch reductions had left English steelmakers high and dry, with quotations at anything from $2.45 to $3.65 a ton above those of Scotland. A meeting in London authorized a reduction of $2.45 in export figures, but this only made matters worse for English structural engineers, who had either to buy English steel or pay carriage cost on the much cheaper Scotch steel, a most serious matter when they were competing for world-wide contracts with the structural engineers on the Clyde. It will be seen that a position almost of deadlock had been reached when the war suddenly broke out, as a bolt from the blue. Half-finished steel immediately ran up to $29.10 per ton for open-hearth, the description most in demand. Mild steel wire was advanced $9.75 per ton, making the new price $47.35, while wire rods, formerly obtainable at $25.50, ran up to $38.80 and has since been advanced to $42.45. Before the end of August, finished steel bars had advanced by $2.45 to $38.80 per ton. In the north of England district, in the middle of July, steel ship plates were $29.10. A month later they were $35.20. Heavy steel rails had advanced from $27.35 to $32.15, and steel beams from $32.15 a ton to $34.60. The prices in November for steel ship plates were $35.20, heavy steel rails $30.90, and steel beams, $34.60. These slight changes fairly indicate the position. It will be seen that the advance has been comparatively moderate, and it is certain that, for this cautious handling of quotations, impending competition from America is responsible in a large measure.

The extremely depressing reports from America during the autumn months undoubtedly prevented undue buoyancy in British prices.

Tin Plate Depressed

The British tin plate trade has had rather a bad time throughout the year. A large part of the mills have been unemployed, and production has never come anywhere near capacity. The year began with a strong effort to restrict production, and, eventually, agreements were arrived at with this object, and met with a fair measure of success. But while production could be restricted, demand could not be created and the arrival of the war, shutting off the best markets of the trade, stopped scores of mills, and will enormously restrict production until the end of the war, however long it may be continued. At the present time, the amount of production ranges somewhere between 50 and 60 per cent of capacity, prices are cut very fine and a further serious blow has been inflicted through the government prohibition of exports to certain European countries. It may be remembered that, in February last, the newly-formed association agreed on a general restriction, for the year, of 15 per cent, but the war has, without

(*Continued on page* 82.)

SIX ETCHINGS

OF

European Iron and Steel Works

BY JOSEPH PENNELL

By Way of Introduction

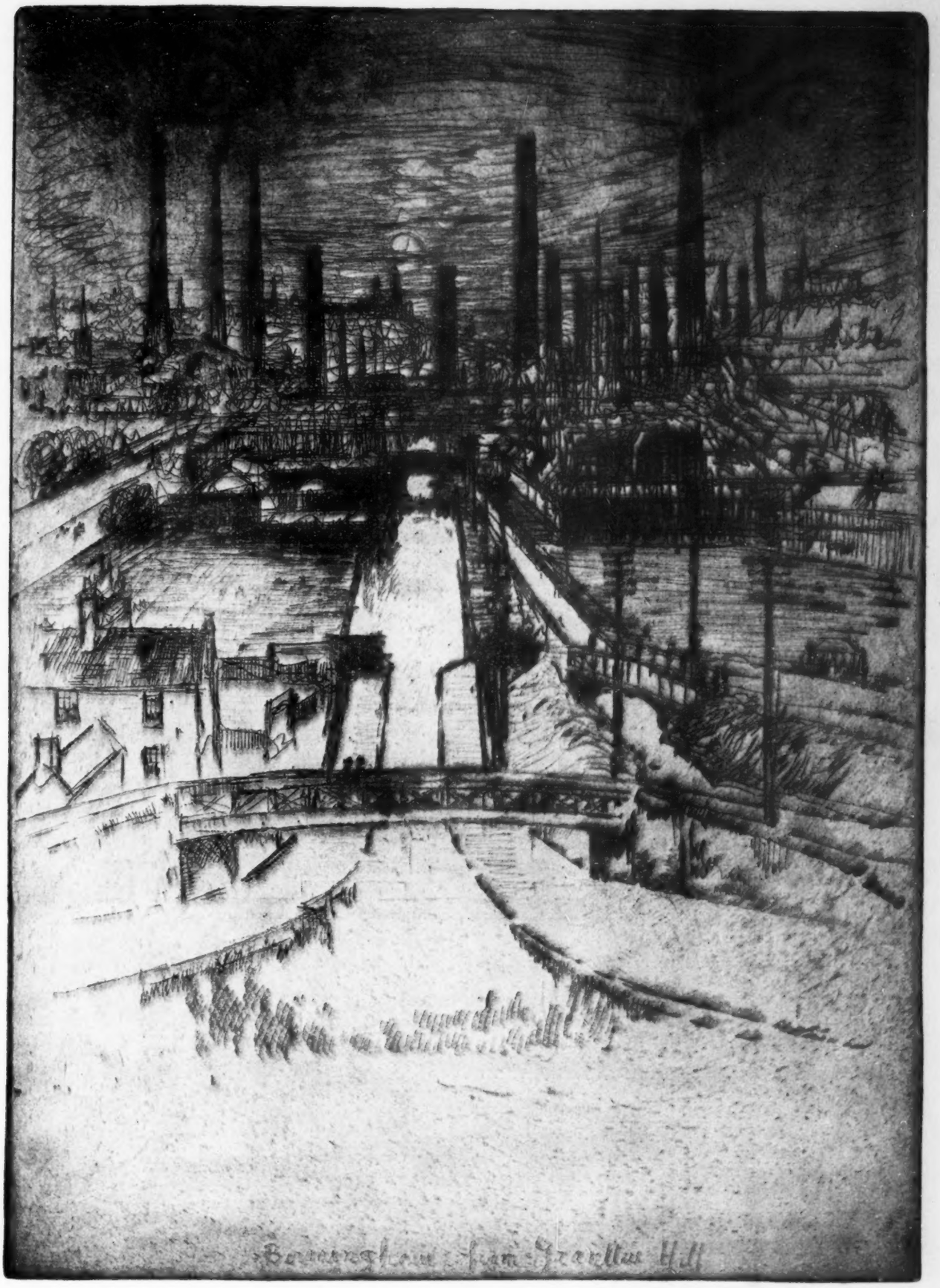
ON THE accompanying pages we are privileged to present a series of six etchings of European iron and steel works by Joseph Pennell. In addition to their artistic value, they are of particular interest at this time on account of their connection with the stirring military events of the day. Without coal, ore, iron and steel, war would be impossible on its present scale and in the last analysis, the side with the superior industrial facilities will be the victor. Pre-eminent in times of peace, in war the iron and steel industry becomes vital to national existence.

No artist is better equipped to portray the power, majesty and true spirit of modern industrialism than Joseph Pennell and in his etchings of iron and steel plants he is seen at his best.

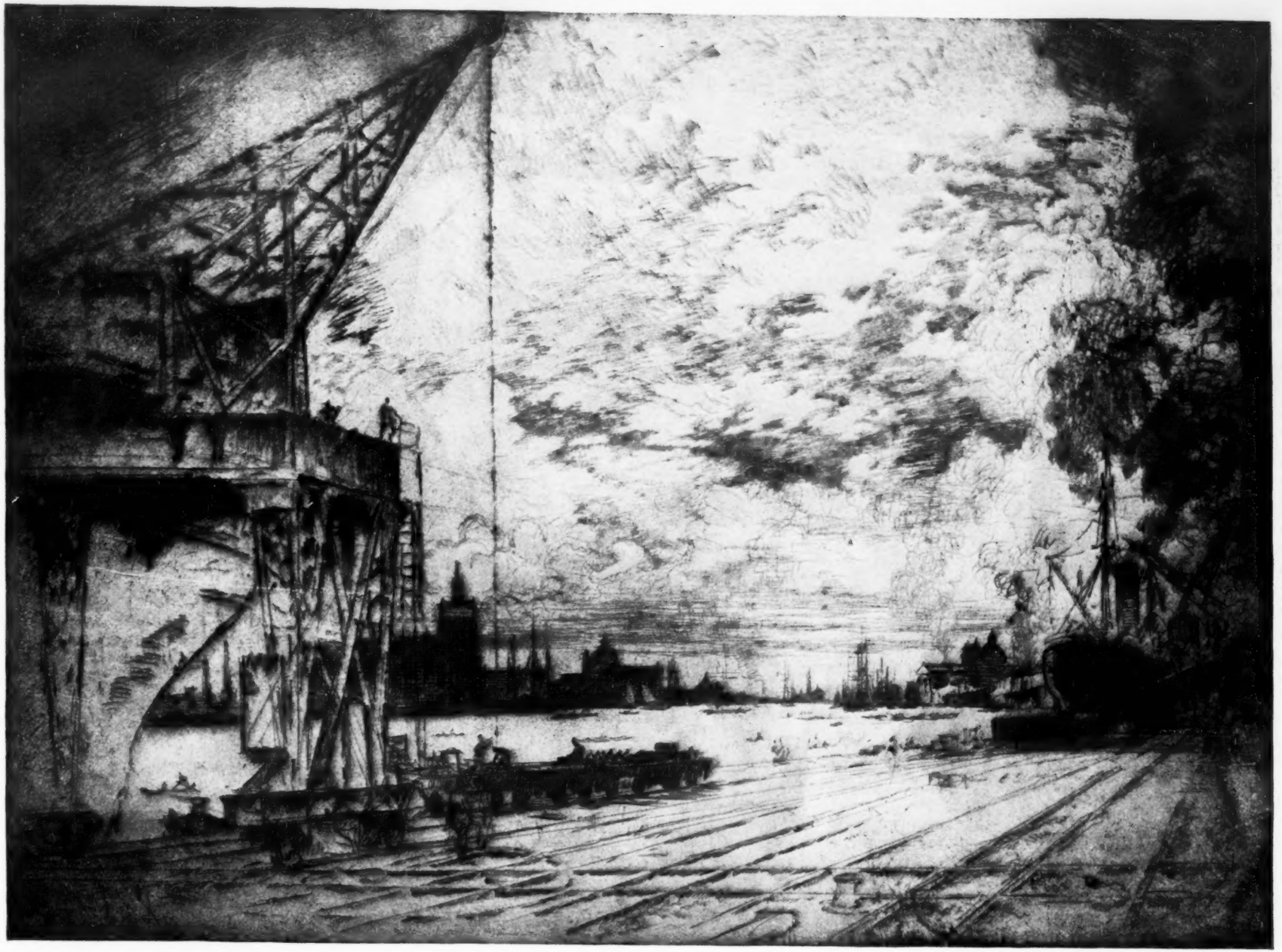
Pennell is an American, born in Philadelphia, July 4, 1860. The foundation of his artistic education was laid in the United States where he attended the Pennsylvania Academy of Fine Arts and the Pennsylvania School of Industrial Art. His work was awarded medals at the Philadelphia, Paris, Buffalo and Chicago expositions, also at Dresden in 1902, St. Louis in 1904, Liege in 1905 and Milan in 1906. He was chairman of the International Jury at the St. Louis exposition. His work is represented in the national collection of Cabinet des Estamps, France; in the Zuffizi gallery at Florence, Italy; the Berlin national gallery; Belgian national gallery; South Kensington museum, England; also at Dresden, Buda Pesth, Melbourne, Perth, Adelaide, and in many state and municipal collections in Europe and America.

In addition, Mr. Pennell is an author of prominence, having written a number of books of travel and published considerable material relating to the illustration of books, lithography, engraving and allied subjects.

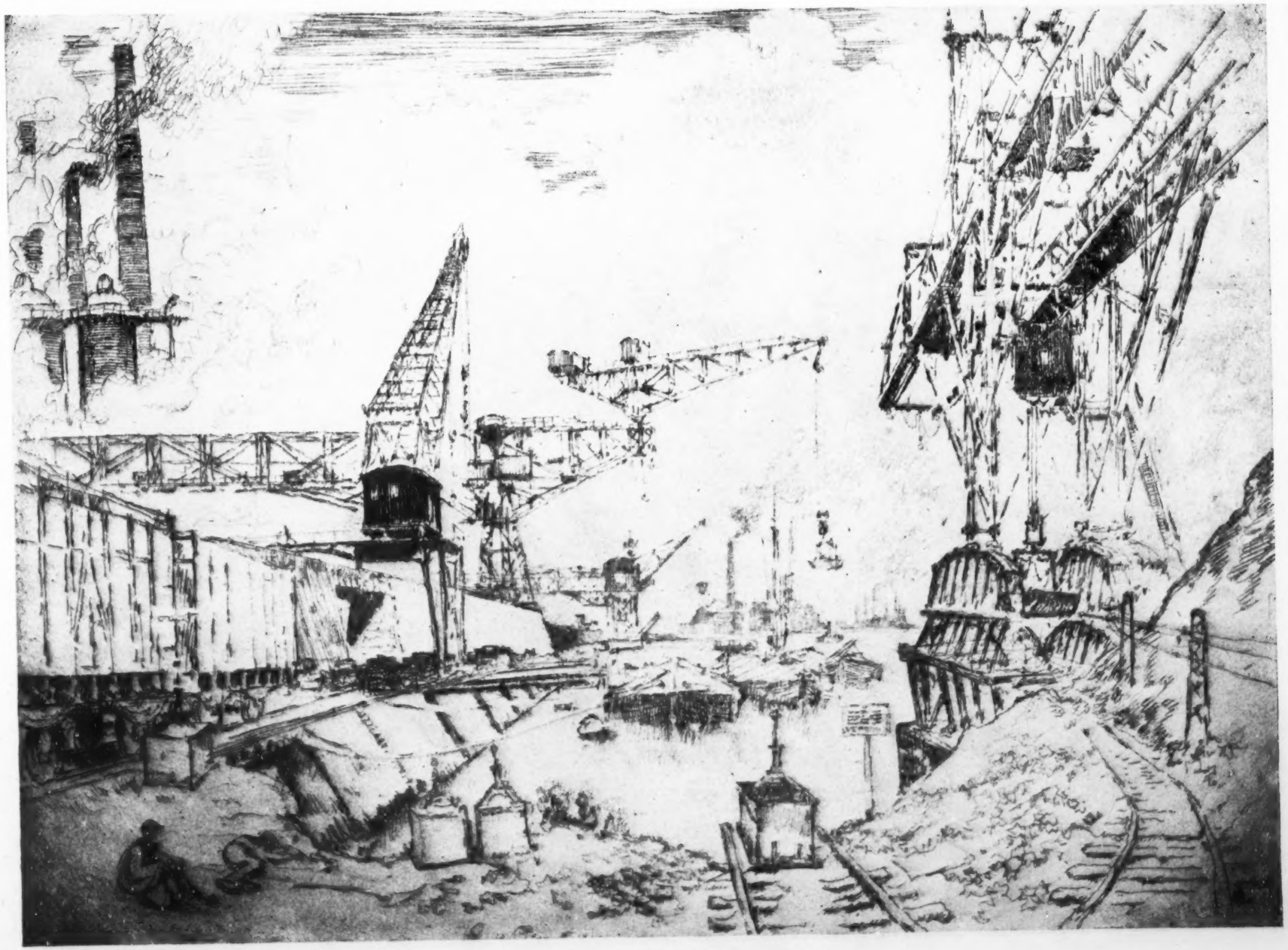
The etchings which we present herewith were printed from plates made by a new process specially designed to preserve all the delicate detail and shading of the originals. They are, therefore, particularly suitable for framing.



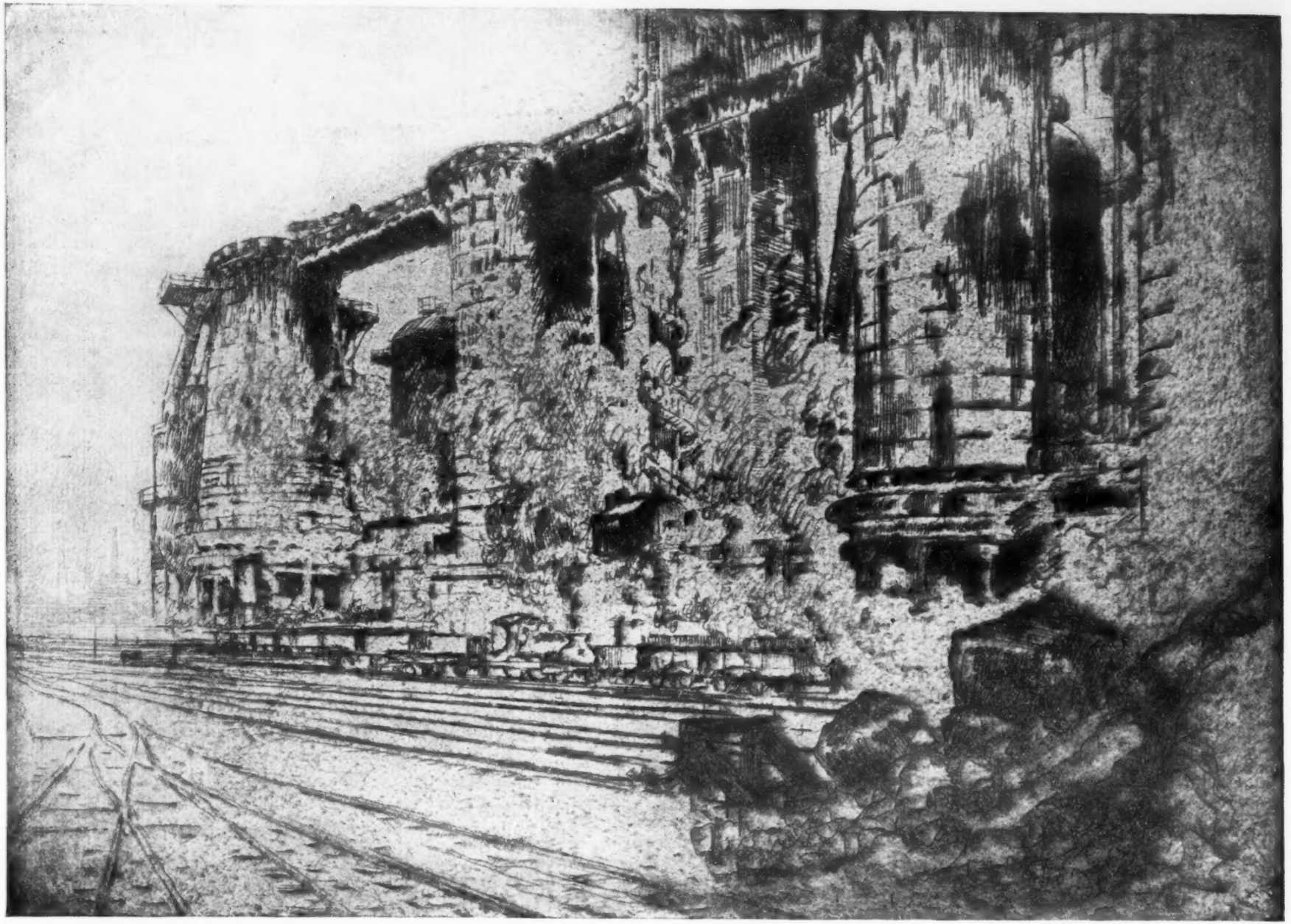
WHERE IRON IS MADE—BIRMINGHAM, ENGLAND



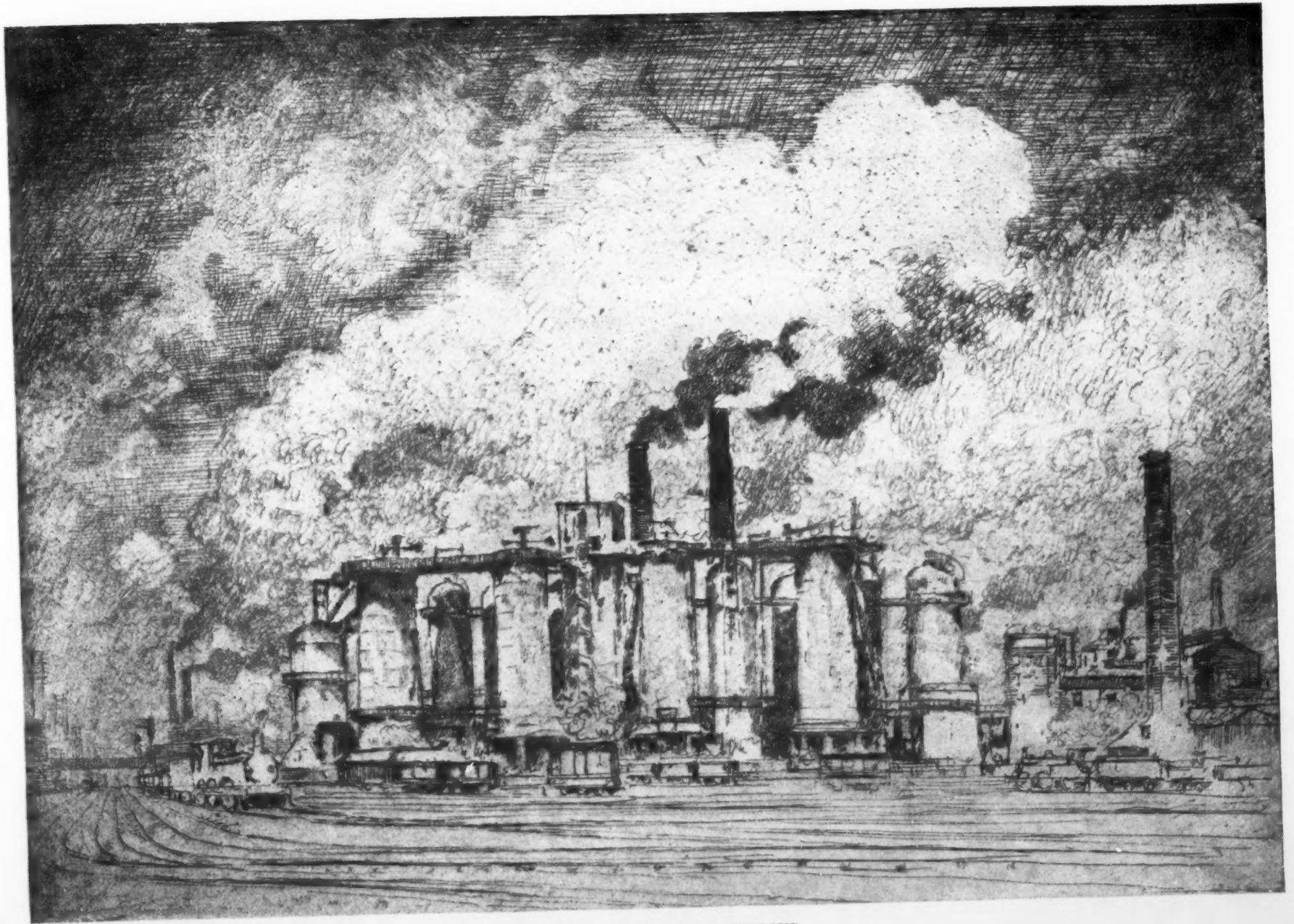
UNLOADING RAILS WITH A GREAT CRANE AT VENICE



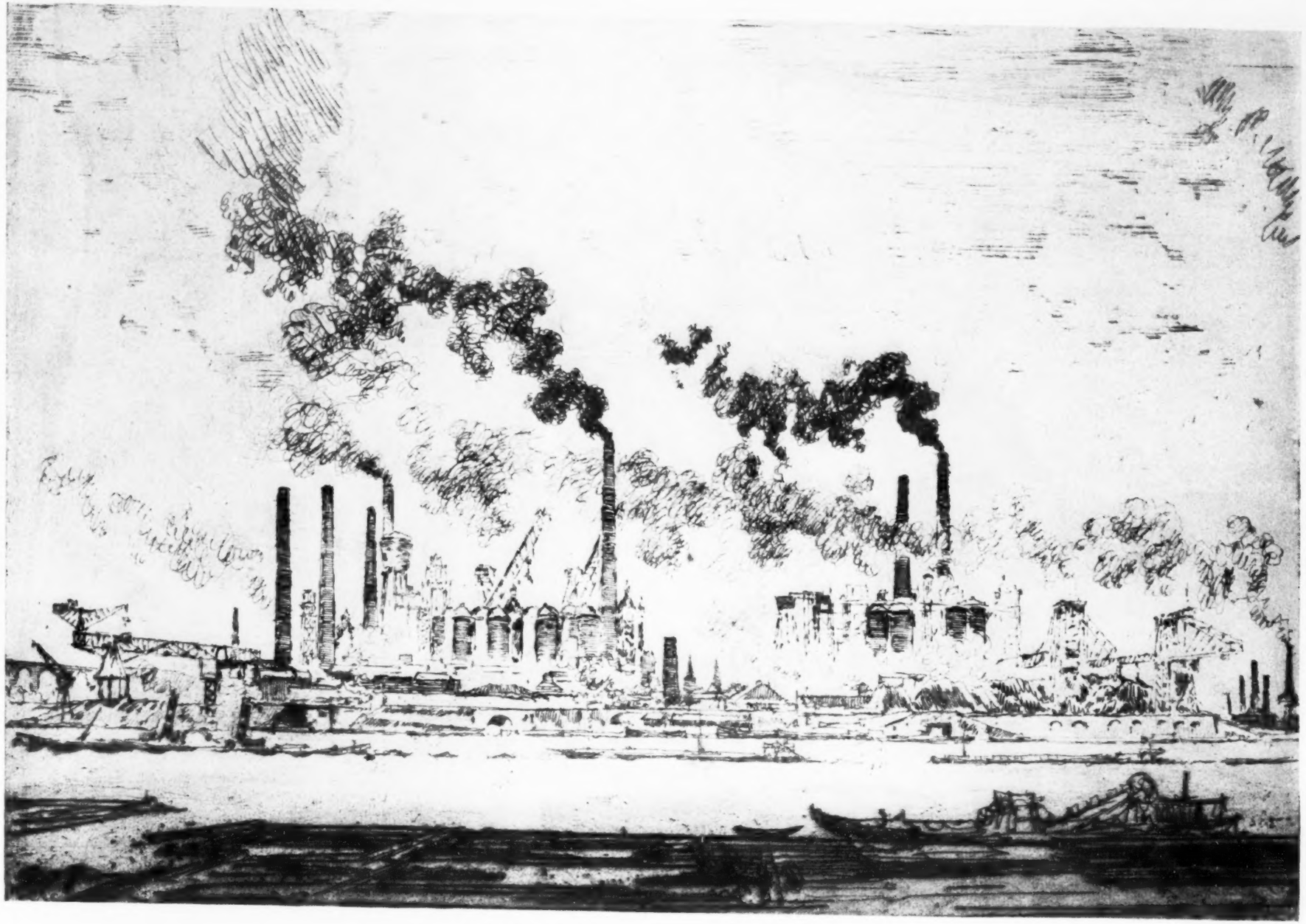
HANDLING IRON ORE IN WESTPHALIA, GERMANY



LEEDS, ENGLAND—BLAST FURNACES



GREAT WHITE CLOUD, LEEDS, ENGLAND



MODERN RHINE CASTLES, DUISBURG, GERMANY

Retailing Steel Mill Products

A Study of the Methods Used by a Great Warehouse to Meet the Needs of Iron and Steel Consumers—Speed Plays as Important a Part as the Steel Itself

IN BUILDING up the great complex and efficient machine of modern business, two principles have been dominant. The first is co-operation; the second is specialization. No doubt some of us can still remember how years ago the small merchant at the corner store handled everything from food stuffs to blacksmith's tools. He raised the vegetables that were sold from his counter, while his wife manufactured and sold the bakery goods.

But this has all changed. Now each company specializes in a definite direction and depends upon its contemporaries for all other requirements. Each has a highly efficient organization concentrated on the manufacture of a certain product or line of products and all co-operate to their mutual advantage.

There is no line of business which brings out this principle in bolder relief than that of steel warehousing. The manufacturer, builder or other consumer of steel products who in years past tied up his capital in large stocks of steel is now realizing the value of the steel warehouse as an immediate source of supply.

The warehousing organizations are equipped to store, cut and deliver everything in iron and steel. They act as purchasing and storing departments for many of the country's factories. They specialize in this one field, and consequently can handle the material at much less cost than many individual concerns whose requirements would not warrant the installation of sufficient equipment to do the work economically. Thus, the warehousing business has come to be a very essential part of the industrial world.

A million tons of iron and steel products concentrated in a single warehouse would have but little significance if it were unaccompanied by an alert and efficient distributing organization. A much smaller stock so controlled as to be available to a large number of buyers in different parts of the country would be of greater value to the ordinary consumer. In selling steel at retail, as in other forms of merchandising, service is the factor of ultimate importance. The consumer expects correct routing, accurate weights, lengths or sizes and service in a dozen other ways. He is as much if not more interested in the service he receives as in the quality of the material itself.

The several large steel warehouses in this country have, therefore, given a great deal of study to the organization and service details of their business, in order that they may meet the needs of their customers with maximum effectiveness. The house of Joseph T. Ryerson & Son has achieved an unusual success because the service idea has been paramount in the policy of this firm since its inception. This article describes the methods employed by the Ryerson organization in handling its business.

Among the first to realize the advantages of the steel warehouse was the firm of Joseph T. Ryerson & Son. This company, established in 1842, has served the trade with prompt shipments in iron and steel for 72 years and has built its organization on the fundamental principles of dependability, accuracy and speed.

Much can be learned from a study of the methods and underlying ideas which have served to develop any successful business. We will, therefore, first touch briefly upon the layout of the plant, offices, equipment and force employed, and later, follow an order through the plant, showing the operation of the methods and systems which have played so important a part in the success of this company.

Thousands of tons of steel products concentrated in three warehouse plants at New York, Chicago and St. Louis would be of little significance if they were not handled by an alert and efficient distributing organization. When the buyer realizes, however, that the steel is not only in stock, ready for immediate shipment, but has been rolled or manufactured to particular specifications, and that each tested item is the product

FIG. 1—OPENING THE MAIL AND SORTING OUT THE ORDERS

of a mill which, experts have learned, is among the best equipped to turn out that particular commodity, then it is that he is assured that the company in question is a real asset to his business.

We might take up the New York or St. Louis plants, but inasmuch as their methods and systems are much the same as at Chicago, we will confine our description to the warehouses in the latter city.

The Chicago plant of Joseph T. Ryerson & Son, located at Sixteenth and Rockwell streets, occupies approximately 750,000 square feet of floor space with ample room and handling facilities for over 150,000 tons of material. The plant is provided with exceptional transportation facilities, and freight for any of Chicago's 31 railroads is delivered to the forwarding carrier within a few hours from the time it leaves the warehouse. Terminal delays are practically unknown.

FIG. 2—GENERAL SALES DEPARTMENT

The accompanying drawing, Fig. 12, shows the layout of the ground floor of the Ryerson plant at Chicago. To the south of Sixteenth street are the structural warehouses, which cover two entire blocks with eight acres of floor space. These warehouses are divided into bays each 500 feet long and varying in width from 45 to 110 feet. All the buildings are of steel construction throughout with roofs of corrugated iron and glass.

The plant has switch track capacity under roof for 49 cars; two tracks extend along the entire east end serving the structural warehouses. The crane in each bay operating over and at right angles to the railroad tracks affords excellent loading and unloading facilities.

The railroad forwarding facilities are supplemented by wagon shipping platforms large enough to accommodate 26 motor trucks and wagons at one time. These, like the switch tracks, are accessible to the entire warehouse crane service. The crane equipment in the structural warehouses alone consists of eight high speed traveling bridges, with a number of radial wall jib cranes and hoists.

Many of the cranes are 100 foot span, 10-tons capacity. Each is equipped with two trolleys operated from a stationary cage. The majority have a bridge traveling speed of 350 feet per minute and a trolley speed of 175 feet per minute. Three high speed friction saws, angle shears, plate shears and other equipment allow cut-to-size orders to be shipped with a minimum delay. Even in the most rushed periods of business, the facilities are such that it is next to impossible to force these warehouses behind schedule.

The friction saws, which are one of the important features of the structural division, represent one of the most rapid and efficient methods known for cutting steel shapes. The steel saw blades are 54 inches in diameter and are motor driven at a peripheral speed of 27,000 feet per minute. By this method a 24-inch, 100-pound beam is cut in less than 20 seconds.

Every ton of structural material is kept under roof in enclosed buildings. This keeps the stock clean and free from rust, which is the objectionable feature of out-door storage. Large sheared and universal plates, tank steel and flange steel are also housed in the south side warehouses. All plates are accessible to the cranes and other equipment used for quick handling, cutting and shipping. One of the main features which enables this section to make enviable records in quick service is the guillotine plate shear which is said to be one of the largest and most powerful machines of its kind.

To the north of Sixteenth street are the general offices and a large heated building containing sheets, plates, bars, hoops, rivets, bolts, tubes, etc. To the north of this building—a part of it in fact—are the large machinery warehouses and display room together with reinforcing bar and specialty warehouses.

The sheet warehouse comprises over 30,000 square feet of floor space, and contains probably the largest tonnage and greatest number of sizes and kinds of sheet steel in the country. This warehouse is heated to a uniform temperature all the year round. The humidity also is carefully regulated as excessive moisture would be harmful. Plain black, galvanized, polished, uniform blue, planished, refined, smooth finished, pickled, extra deep stamping, patent leveled, auto stock, lead finished, electrical and numerous other special sheets are housed in these store rooms. Many kinds of sheets are oiled to keep

FIG. 3—WORK ORDER SALES DEPARTMENT

them from rusting and from becoming scratched. Others are kept in sealed steel packs for protection. This division is equipped with two large sheet shears to facilitate the rapid handling of cut-to-size orders. Corrugating rolls, painting vats and other special equipment give the departments a wide scope of service.

Opposite the sheet rooms on the second floor are the boiler, flange and tank steel plates as well as the firm tread floor plate stocks. All the stock is accessible to the cranes which move off the main trolleys to the side trolleys. The latter run down the center of each bay at right angles to the main aisle.

The main crane runway extends the full length of the building from north to south. The space is open from first floor to roof so that two cranes may work one above another. The upper crane serves the second floor, the lower crane serves the first, yet both deliver to the assembly bays at the truck entrance. This equipment serves the sections where the plates, boiler heads and specialties, rivets, bolts, bars and tubes are stored and is an important factor in quick and efficient handling.

A single switch track extends the entire length of the north side warehouses on the east, while a double track enters at the northeast corner and curves, running east and west through the middle of the buildings.

FIG. 4—ENTERING ORDERS AGAINST STOCK RECORDS AND MAKING OUT JOB TICKETS

The bars are stored on the first floor below the sheets and plates. This stock includes mill steel bars of all sizes and shapes, Ulster iron, hoops, bands in scrolls, cold rolled shafting, strip steel, wire, etc. The bars are placed on end in racks, each size and shape having a separate space. When filling orders, the warehousemen throw the bars down onto strong, two-wheeled trucks. This has been found to be the swiftest and best way of handling bars.

The rivet and bolt section, which includes structural rivets, burden iron, rivets, tank steel rivets, etc., is arranged by sizes much the same as the bars.

In the northwest section is the large machinery display room, served by a 10-ton crane. In this division a large number of metal working machines of all kinds and sizes are stocked. On short notice any machine may be connected up to electricity or a belt for demonstration purposes.

The company has designed a line of special machines for railroad and industrial shop work, including friction saws, bevel shears, serpentine shears, flue and spring shop machinery, etc.

The concrete reinforcing material warehouse is east of the machinery section. It is probably the only warehouse of its size in the country devoted exclusively to reinforcing materials. This building contains plain, square, round and cold twisted bars of all standard sizes and lengths. Many other reinforcing specialties also are in stock. Special cutting machinery, as well as bending and twisting machines, and other necessary equipment enables the company to take care of cutting, bending, tagging, etc., for customers whose shops are unable to handle this work.

The tool steel department, occupying another section of the building, maintains a large stock of high speed and carbon tool steels. This department, equipped with two electric hardening furnaces and one oil furnace, is in a position to harden customers' tools whenever called upon to do so.

FIG. 5—ENTERING AND FOLLOWING UP WORK ORDERS

A large portion of the first floor of the main building is devoted to the offices of the shipping department, to the east of which, extending about half the length of the building, are the assembly bays for the north side warehouses. These bays are open to the street on one side, where the teams back in for their loads. They are equipped with electric loading cranes, dial scales, motor hand trucks and other modern machines necessary for the rapid handling of material.

Since speed is as important a consideration as the steel itself, much thought and effort has been given to perfecting the organization for swiftly handling the business. Special mail arrangements, a private telegraph station and exceptional telephone service make many rush orders only a usual part of the regular day's work.

As an example of the facilities of the Ryerson organization for meeting unusual situations, as well as to get

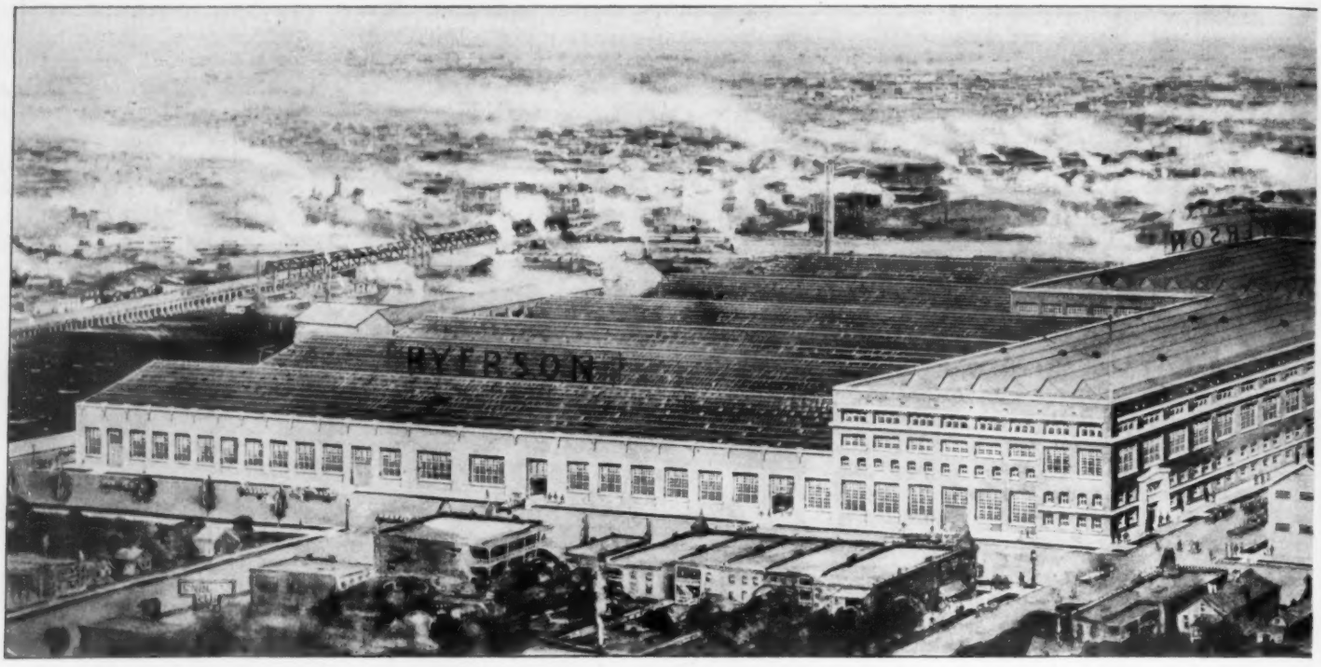


FIG. 6—GENERAL OFFICES AND WAREHOUSES OF JOSEPH T. RYERSON & SON

an insight into the methods of handling an order and the departmental systems used, let us follow an emergency order through the plant.

The purchasing agent of a well known Detroit automobile manufacturer telephoned the Ryerson Detroit branch one morning in October, and placed an order for a heavy carload of several special sizes of blue annealed sheets. "We must have the material at once," urged the purchasing agent. "We're caught short and delay means loss in time and money." The Detroit representative, realizing there was not a second to be lost, immediately telephoned the order to the plant in Chicago.

It is 9:30 A. M. as the sales department takes down the order. A "lightning" tag is placed on it and away it goes by special boy to the credit department. The messenger waits a moment to get the needed approval and time stamp and returns to the sales department. The order is now checked and carried to the store order department. This department writes up the order and checks the original with the written tickets to prevent errors. The time stamp shows 9:40 a. m. on the back of each ticket as it shuttles down the chute to the shipping department. Shipping, the pace setter, marks the time of shipment on the original and sends the copy at once to the warehouse department in which the material is kept.

It is now 9:45 a. m. and the warehouse has begun work on the carload. It is advised by the shipping department that the car must be loaded ready to pull by 12:00 o'clock.

The sheets must be cut to size. It is going to be a close call, but the warehouse departments are used to rush orders and tackle the work with assur-

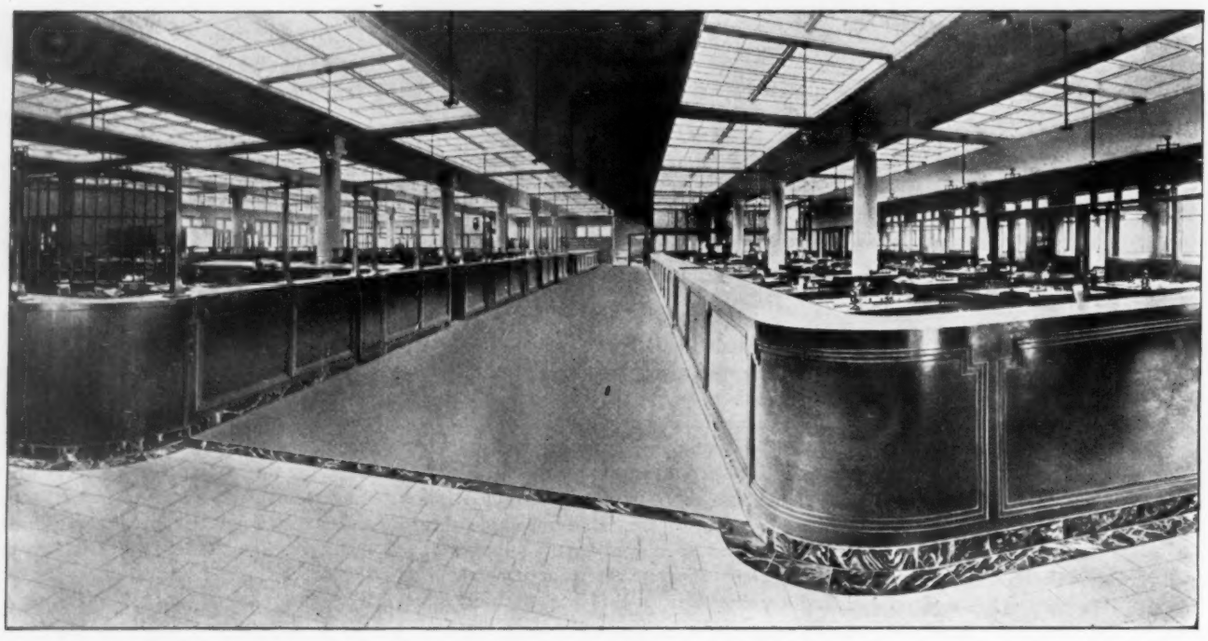


FIG. 7—INTERIOR OF GENERAL OFFICES

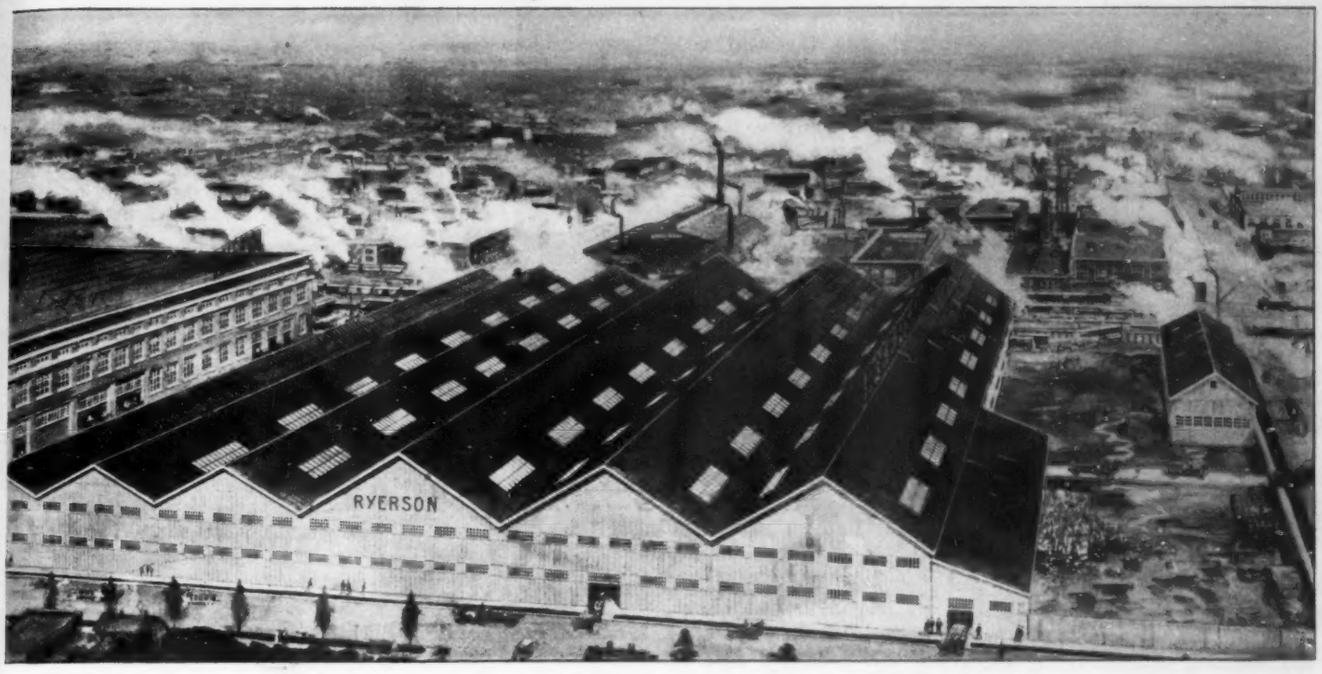


FIG. 8—STRUCTURAL WAREHOUSES OF JOSEPH T. RYERSON & SON

ance that the material will be ready on time. The various sizes of sheets are assembled and the cutting operations begin. Two large sheet shears commence immediately to make the necessary cuts, which are completed in time to load the car.

This is no sooner done, however, than down the side track comes the switch engine to pull the various cars, loaded ready to begin their journey. The car is in possession of the forwarding line within two hours and leaves the same afternoon for Detroit. It arrives in that city the next morning, is switched to the company's side track, and is placed and unloaded before 1:00 o'clock of the same day. This means that the customer in Detroit received the carload of sheets all cut to the special specified sizes, within 27 hours from the time the order was placed.

More spectacular deliveries might be mentioned such as the handling in 45 minutes of a Minneapolis call for 200 sheets of steel, each stenciled with the buyer's name and address; the cutting, loading and starting in three hours of a double carload of beams and angles, badly needed in Pittsburgh, and many others. Of course all orders do not require such spectacular service, but when the emergency arises, the facilities are waiting.

To outline this firm's methods, an emergency order has been cited for the reason that all orders are pushed to completion and delivery at the earliest possible moment that satisfies the buyer's needs and yet generates no friction or lost motion in the house machine.

In order to maintain an efficient organization the methods and systems for accurately and speedily handling orders must be worked out with the greatest care.

In the first place, the Ryerson company runs an automobile between the

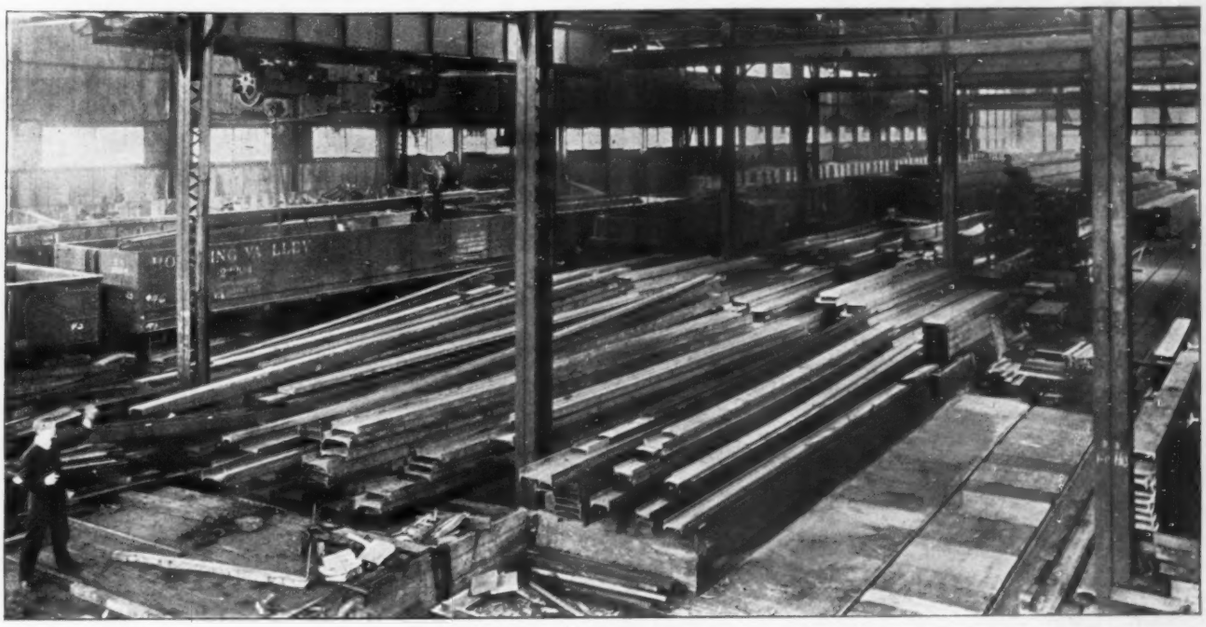


FIG. 9—LOADING STRUCTURAL MATERIAL INTO CARS

FIG. 10—WHERE YOUR ORDER IS DISPATCHED

central post office and the plant every hour, in order to speed up the incoming and outgoing mail. This car also takes customers from the downtown office at 233 Railway Exchange building to the plant and general offices at Sixteenth and Rockwell streets. The car makes its first trip from the post office and city office at 7:00 a. m. and continues all day, leaving the plant on the half hour and the city office on the even hour until 5:30 p. m. The company also has a private telegraph operator that no time may be lost on telegraphic advices and orders. A private telephone switchboard with 101 individual connections makes it easy to come in contact with any department of the business.

To work in conjunction with the first automobile mail in the morning, there is an early man in each department, so that the orders coming in at that time are in the warehouse before many companies have received their mail.

Orders get no chance to loaf by the way. Every one must shuttle through a gauntlet of time stamps from the credit department to the shipping tracks. Neglect means detection; the system of supervision and mechanical checks makes it well nigh impossible for an order to encounter delay.

When writing up an order, the store order department makes as many carbon copies as there are departments in which the material in question is located, as well as one for entry purposes and shipping.

The shipping department, acting as the pace-maker on all orders, advises when they must be shipped to make the best time. This department is able to give this advice almost immediately since it maintains a record covering the traffic facilities of each town which harbors a customer. This record contains the names of the railroads, the closing time for package cars, the hour carloads must be delivered at the suburban pick-up yards, the time in transit on each line and the efficiency of each road. The customer's name also is recorded with his preferred and alternate routings.

The traffic men have a schedule covering the departures of the 2,500 fast package cars operating from Chicago to 1,500 cities of the country daily. With but one transfer these package cars deliver to 90,000 towns. When time is too brief to catch a direct train, a judicious combination of other routes and connections often allows delivery in advance of the next direct train. As soon as the time, routing, etc., has been decided upon, the shipping department advises the customer. Thus the buyer can plan his work accurately, knowing that the warehouse will follow the shipment to assure its delivery on schedule.

When the warehouse dispatcher receives the orders, he marshalls his forces much the same as a railroad dispatcher handles his trains over a busy division. Scientific time study has evolved standards which allow him to calculate very closely just how long it will take to complete each order with the number of men at his command. Should the amount of time necessary exceed the time available, he may call in men from the extra gang employed elsewhere about the plant.

With the shipping time on every order, the dispatcher places each in rotation according to the time at which it is to be shipped. This does not mean that each order is shipped in turn as it comes in, but it does mean that each is shipped on the first available car or truck as the case may be. The dispatcher bunches all small orders, putting them through as one large one. This gives every order, no matter how small, as prompt service as the largest.

The workmen are paid by a bonus system which encourages them to maintain and improve upon the standards of time that have been set. Much time and study is given to the methods and motions of men in throwing down bars, loading sheets, etc., By following instructions which teach them what motions are necessary and what may be eliminated, many men are earning 30 to 50 per cent over their regular wages.

Joseph T. Ryerson & Son do not remain satisfied, however, with the present status of service but maintain a betterment department whose duty it is to continually study the conditions, methods and systems of the organization. This department is composed of men who by special study and natural aptness are best fitted to improve upon present practices. Suggestions for improvement in stocks, equipment, methods, systems, etc., are gladly welcomed from customers and employes alike and all new plans are

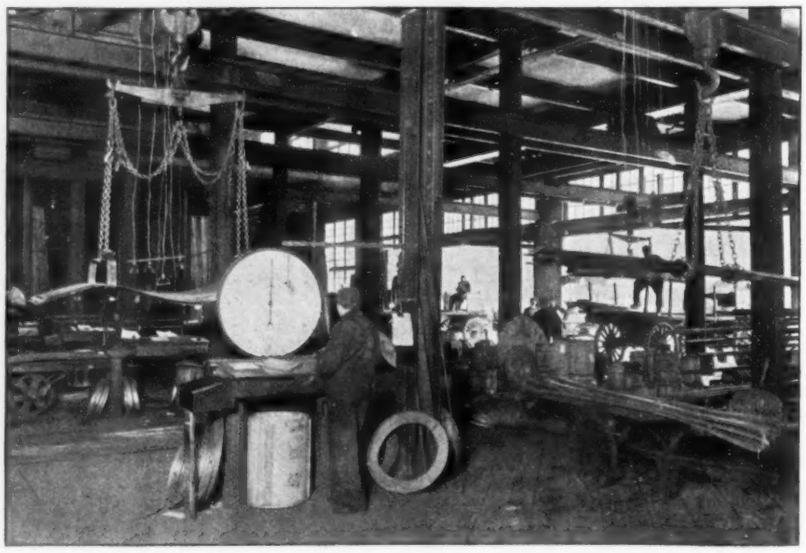


FIG. 11—ASSEMBLING SHEET AND BAR ORDERS

thoroughly sifted to the bottom until they are either adopted or discarded according to the results of the investigation.

Another important feature which assures a dependable and smooth running plant is the maintenance department. This department, working in conjunction with the betterment department, has standardized all the parts of the equipment in use. Extra parts are kept in stock so that a broken part cannot cause a stop in service. The force also stands ready to immediately repair any damage to machine, track or other equipment when necessary.

The company has always appreciated the fact that an efficient organization depends largely on co-operation and team work and that to reach this end and keep the best men in both office and warehouse, the employes' interests must be carefully considered. The betterment department has accomplished much in its work along this line. The company also maintains a lunch room, reading and rest rooms, and barber shop for the convenience of the employes. Friends and customers also enjoy these privileges while at the plant.

The practice of making immediate deliveries is a valuable selling point and an important factor in obtaining and holding business. It also is a feature of which every manufacturer and wholesaler can take advantage. For, if steel back bones for bridges and skyscrapers can be cut and shipped with certainty and dispatch, what excuse is there for delays in the shipment of wheelbarrows, tack hammers, or ten thousand other articles that gather dust in countless warehouses and factories of the country? Service is an essential factor in modern business and a reputation for reliability, accuracy and speed constitutes one of the most important elements in the success of such firms as Joseph T. Ryerson & Son.

Book Review

Graphic Methods for Presenting Facts, by Willard C. Brinton; 371, 7 x 10-inch pages; cloth; published by the Engineering Magazine Co. and furnished by THE IRON TRADE REVIEW for $4.00 net.

A survey of the methods used by the average person in presenting statistical data in graphic form will convince anyone of the need for this book. To quote from the author's concluding paragraph, "Newspapers and magazines are daily presenting more and more statistical information. If we study the subject even a little, it will be seen that each of us deals daily with a vast number of facts of a quantitative nature which could preferably be presented in graphic form. When graphic methods are more widely used for portraying quantitative facts, there will be a tremendous gain to accuracy of thought as well as a great saving of that most valuable thing in the world—time."

In the preparation of this book there has been a constant effort to present the subject from the point of view of the business man. Mathematics has been entirely eliminated. Technical terms are avoided since the readers whom it is most desired to reach are those who have never had any special statistical training. A consistent effort has been made to keep the whole book on such a plane that it may be found readable and useful by anyone dealing with complex facts of business or government. A definite effort has been made to produce a work which can be termed a hand book for anyone who may have occasional charts to prepare for reports, for magazine illustration, or for advertising. The book is so arranged that a busy reader may get the gist of the matter by looking at the illustrations and reading only the titles and sub-titles. A large number of illustrations are presented, reproducing actual charts, and these are accompanied by interesting criticisms. This book would be useful to anyone who is interested in compiling data, and in marshalling and presenting facts for the purpose of influencing judgment and action.

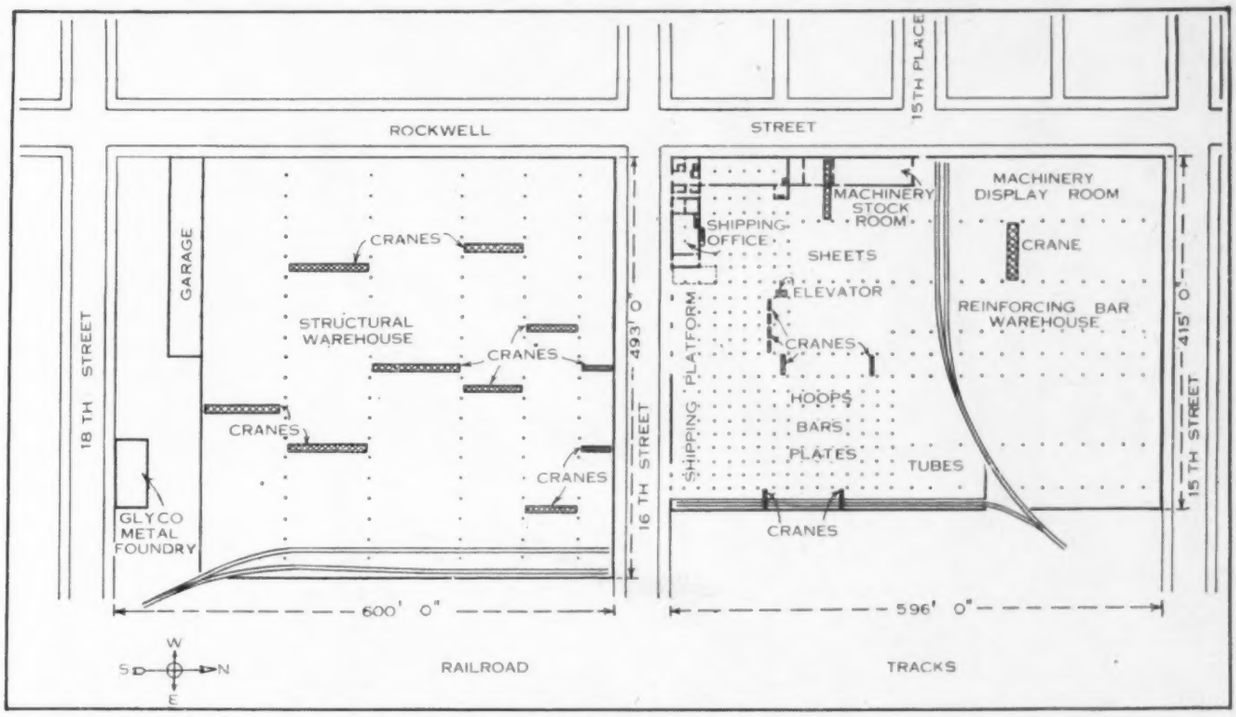
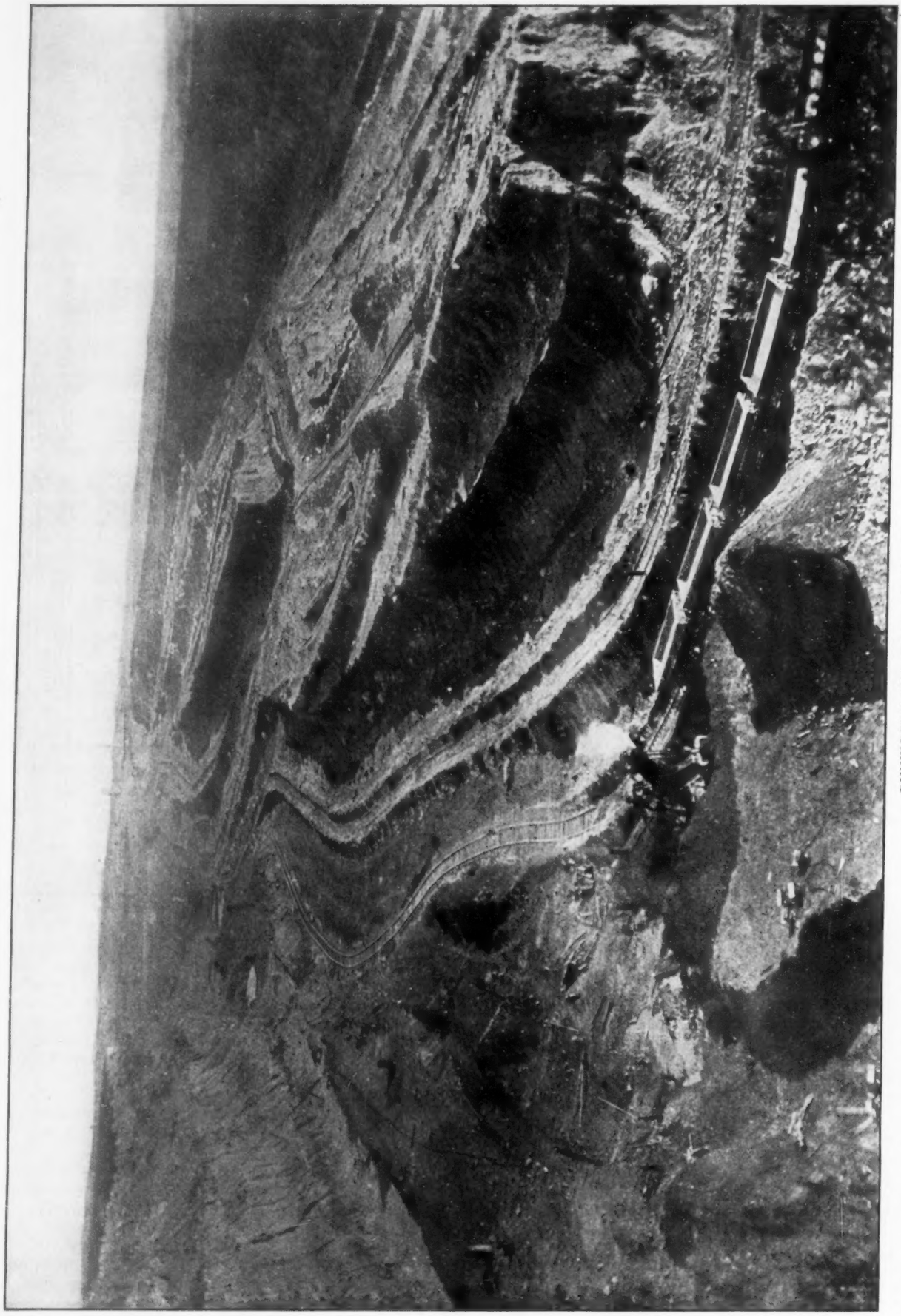


FIG. 12—PLAN OF RYERSON PLANT AT CHICAGO

The Lake Shore Engine Works, Marquette, Mich., recently has completed 14 stock pile cars for the Arthur Iron Mining Co., which operates the properties of the Great Northern ore trustees on the Mesabi range. These cars have a capacity of 70 cubic feet and are 8 feet 7 inches in length, 5 feet 8 inches in height and 6 feet 1 inch in width. They are fitted with four 16-inch wheels, 36-inch gage, wheel base 3 feet.



DUNWOODY PIT NEAR CHISHOLM

This is one of the new properties of the Great Northern Ore Trustees. It will be ready to ship in 1915. Up to date over 5,000,000 cubic yards of overburden have been stripped from the ore. The pit is adjacent to the Monroe operated by the United States Steel Corporation.

Independents Are Conspicuous

A Review of Interesting Developments of the Past Year on Minnesota Iron Ranges—Great Northern Activities a Center of Interest—Wild Cat Promotion Curbed on Cuyuna Range

BY H COLE ESTEP

IN A SEASON in which ore shipments fell off nearly 35 per cent compared with the year before to a point over 15 per cent below the average for the previous ten years, developments of unusual interest would not ordinarily be expected. Although this was the condition of affairs in the Lake Superior iron ore industry in 1914, the year nevertheless was replete with interesting changes and events. The readjustments resulting from the lack of activity in themselves presented many intricate problems to the mine operators. In every direction organizations have been curtailed to the minimum, but at the same time it has been necessary to retain a certain nucleus from which to rebuild when the demand for ore improves. Owing to the large amount of ore which they control and the termination of the Hill lease by the United States Steel Corporation, the activities of the Great Northern ore trustees have been watched with unusual interest. Scarcely less interesting are the steps that have been taken by the Oliver Iron Mining Co., a subsidiary of the Steel Corporation, to provide an adequate supply of ore for the future needs of the world's greatest steel manufacturer. In addition, attention has been directed to questions of taxation, concentration, ore reserves, stock pile tonnages and readjustments in wages and prices of mine supplies. For a number of reasons, particular interest also has been centered on the activities on the Cuyuna range.

A close estimate of the shipments during the year, including the small amount which went forward by rail during December, indicates that 32,121,897 tons were forwarded from the entire Lake Superior district. The extent of the curtailment in mining operations can be appreciated when this figure is compared with the shipments for 1913, which aggregated 49,947,116 gross tons. The falling off amounts to 17,825,219 tons, or 35.75 per cent. The shipments by ranges for 1914 and 1913 are given in Table I. The Cuyuna is the only range to show an increase. During the past season, the Minnesota ranges forwarded 23,238,301 tons, or 72.5 per cent of the total. The Mesabi range furnished 21,447,998 tons, the Vermillion range 931,077 tons and the Cuyuna range 859,226 tons, Mesabi shipments being 67 per cent of the total shipments from all ranges. The state of Minnesota, therefore, continued to supply by far the great bulk of the iron ore requirements of the country and the pre-eminence of the Mesabi range is undiminished in spite of the large discoveries of ore which have been made on the Menominee range, particularly in the Mastodon field and at other points.

Table I.

APPROXIMATE SHIPMENTS BY RANGES.

Range:	1914. Gross tons.	1913. Gross tons.
Mesabi	21,447,998	34,038,643
Vermillion	931,077	1,566,600
Cuyuna	859,226	733,021
Total Minn.	23,238,301	36,338,264
Marquette	1,363,419	3,966,680
Menominee	3,755,726	4,965,604
Gogebic	3,664,451	4,531,558
Mayville, etc.	100,000	145,010
Total	32,121,897	49,947,116

Owing to the great shrinkage in shipments during the past season, the figures for the preceding ten years are interesting for purposes of comparison. The shipments from 1904 to 1913 both inclusive, were as follows:

Year.	Gross tons.
1913	49,947,116
1912	48,221,546
1911	32,793,130
1910	43,435,171
1909	42,586,869
1908	26,014,987
1907	42,266,668
1906	38,565,762
1905	34,384,116
1904	21,849,401
Total	380,064,766

As the foreging table indicates, the ten year average, 1904 to 1913, is 38,006,476 tons, 1914 shipments being 5,974,579 tons under this figure.

The relative strength of the Steel Corporation is indicated by the figures covering shipments of the Oliver Iron Mining Co. from the Minnesota ranges, which aggregated 14,173,208 tons. This is 61 per cent of the total Minnesota shipments. This showing is due partially to the extremely limited demand for merchant pig iron which existed throughout the year. The Steel Corporation makes no pig iron for sale, under ordinary circumstances, except in the south and therefore has been able to maintain its mining activities on a better basis than many of the independent operators who depend to a considerable extent on merchant blast furnaces for the consumption of their ore.

Figures covering shipments from the mines of the leading independent steel makers indicate there has been no tendency on the part of the Corporation to use its immense organization to obtain business to the detriment of its competitors. Business conditions considered, the showing of the independent steel companies is particularly commendable. For instance, the Republic Iron & Steel Co. forwarded 1,003,047 tons, of which 804,953 tons came from the Mesabi range. Most of the Republic's activity was confined to three mines, the Kinney, which shipped 342,456 tons, the Union which forwarded 244,436 tons, and the Pettit which shipped 120,868 tons. The Wisconsin Steel Co., a subsidiary of the International Harvester Co., shipped 357,693 tons from three mines, the Hawkins, Agnew and Perkins. The Interstate Iron Co. and the Leetonia Mining Co., affiliated with the Jones & Laughlin Steel Co., sent down 921,043 tons. The Inland Steel Co. shipped 475,484 tons from three mines.

The shipments by railroads given in Table III shows that the Great Northern still controls the bulk of the traffic. This system forwarded 10,450,522 tons of ore during the past season, or 32.7 per cent of the total Lake Superior shipments and nearly half of the Mesabi range shipments from which all of the Great Northern ore is received. Great Northern shipments in 1913 were 13,060,811 tons, the falling off in 1914 being 2,610,389 tons. This clearly indicates the great benefit which the Great Northern railway system derived from the lease on Great Northern ore properties held by the Steel Corporation until Jan. 1. This lease provided that all of the ore must be shipped in the Hill road, the minimum for 1914 being 6,000,000 tons. Therefore, while Great Northern shipments for the past season showed comparatively little loss, shipments over the other Minnesota railroads, particularly the Duluth, Missabe & Northern, and the Duluth and Iron Range, controlled by the Steel Corporation, suffered a tremendous shrinkage. The shipments over the Soo line through the dock at Superior and the tonnage carried by the Northern Pacific show increases, owing to

activities on the Cuyuna range. Shipments over all of the other railroads, show decreases corresponding approximately to the general slowing down in activity. It is believed, however, that the shipments over the Great Northern during the next few years will show a further decline, owing to the fact that the Steel Corporation now is in a position to divert its tonnage to its own lines and the Great Northern ore trustees have not as yet developed sufficient tonnage from their own mines to make up the deficiency caused by the cancellation of the Hill lease.

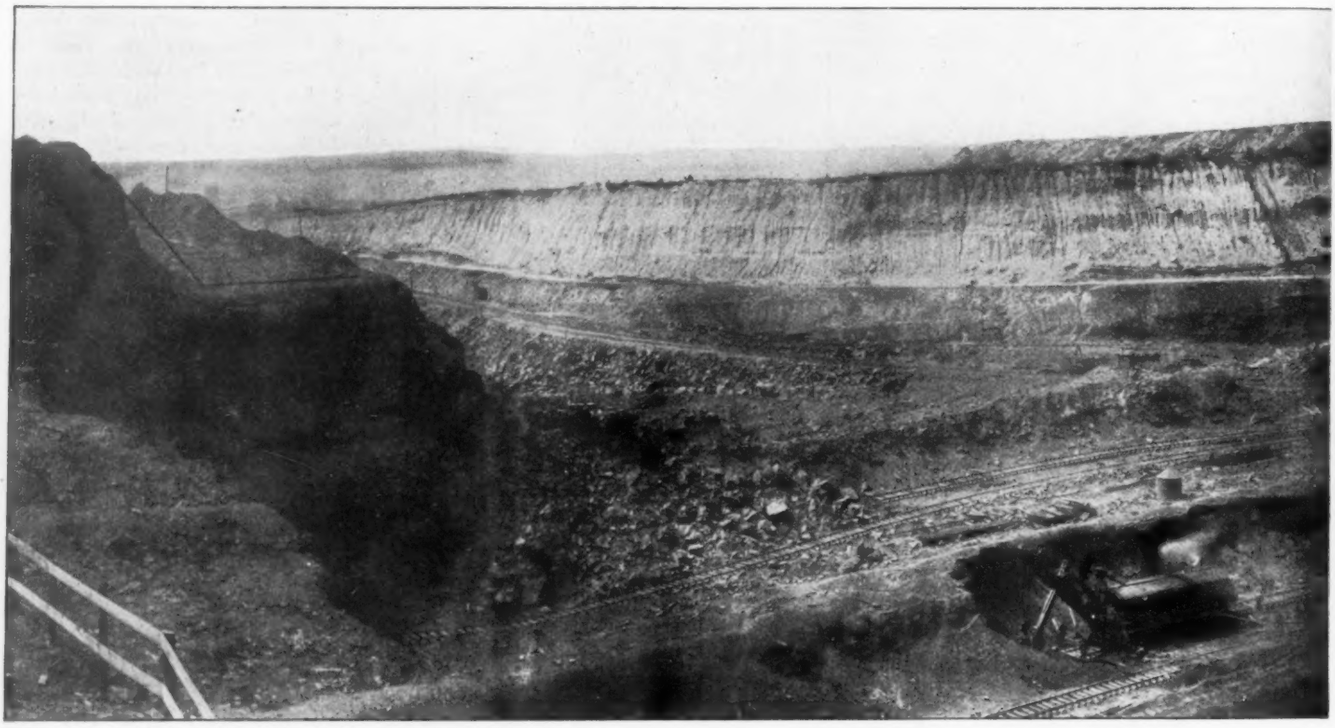
In October, 1911, the directors of the United States Steel Corporation announced they would terminate the lease which had been executed between the Great Northern trustees and the Great Western Mining Co., a Steel Corporation subsidiary. The past year, therefore, witnessed the final shipments under this now famous contract and again brought prominently into the foreground of mining developments the questions surrounding the disposition of the Great Northern properties. The great importance of the Great Northern holdings is indicated by the fact that they were estimated to contain over 400,000,000 tons on Jan. 1, 1914.

In our review of iron mining operations, published Jan. 4, 1912, it was stated that three courses of action were open to the Great Northern trustees. They could organize an operating company to mine the ore and sell it on the open market; they could re-lease the entire acreage again to some large interest; or they could split up the properties and lease them to a number of separate independent mine operators. It is now evident that the situation will be met through a combination of the first and third of the foregoing suggestions. Over a year ago, the organization of the Arthur Iron Mining Co., a Great Northern subsidiary, was so arranged that it could take charge of the properties reverting by the cancellation of the Great Western Mining Co.'s lease. It also was placed in a position to develop new mines on Great Northern land to replace those which were nearly or partially exhausted by the Steel Corporation. Accordingly the Arthur Iron Mining Co. has proceeded vigorously with the development of several new properties and at the present time is operating a number of the underground mines relinquished by the Corporation.

Early in December, the Great Northern interests announced that they had made a contract with M. A. Hanna & Co., Cleveland, for the sale of their ore. A few weeks previous to this, the execution of a lease covering certain portions of the Dean-Itasca mine, a Great Northern property, to Tod-Stambaugh & Co., Cleveland, had been announced, indicating that the trustees are prepared to ship and sell their own ore and also to lease certain of their properties to other operators when the terms are considered advantageous.

Table VII gives details regarding shipments from the Great Northern properties, that were operated last year by the Oliver Mining Co., together with the shipments from other mines leased by the Great Northern trustees. Although the lease held by the Steel Corporation covered a vast acreage and tonnage, it by no means included all of the Great Northern properties, as some people believed, but only a portion of them. Previous to the execution of the lease to the Steel Corporation, a number of important mines had been leased to various independent interests. These include the Mahoning mine, which has total shipments of nearly 19,000,000 tons to its credit, the Utica property operated by Pickands, Mather & Co., the Leetonia, in which the Jones & Laughlin Steel Co. is interested, and the Stevenson operated by Corrigan, McKinney & Co. These transactions are referred to in the reports of the Great Northern trustees as "old leases."

Table VII indicates that total shipments from the Great Northern leased properties up to Jan. 1, 1915, were 68,456,155 tons, of which the Steel Corporation mined 29,606,058 tons. Steel Corporation shipments from the Great Northern mines in 1914 were 6,011,161 tons, or slightly in excess of the minimum stipulated by the lease. Inasmuch as the deficiencies in shipments from 1907 to 1910 inclusive were more than made up by excess shipments from 1911 to 1913, the Corporation terminated the lease with a surplus to its credit.



SAUNTRY-ALPENA PIT NEAR VIRGINIA, MINNESOTA. THIS PROPERTY, OPERATED BY OLIVER

Owing to the large quantities of ore which have been shipped from the Great Northern properties, the impression should not be permitted to gain ground that the Great Northern trustees will have any vast tonnage to sell in the near future at low prices. In this connection, the following quotation from an editorial published in THE IRON TRADE REVIEW, Dec. 10, 1914, is pertinent:

"It can be officially stated that the trustees will not permit their agents to make any special effort to sell a large tonnage at present prices. Unless the market improves materially, it is very probable the Great Northern will dispose of only a little ore during 1915. There will be no attempt to overload a top-heavy market and the trustees believe that the present low mining costs will more than outweigh the cost of carrying their ore in stockpiles for one or two seasons. Therefore, those consumers of ore who believe that the entry of the Great Northern into the field means an indefinite prolongation of prevailing prices, coupled with an unlimited supply of merchant ore, are doomed to disappointment.

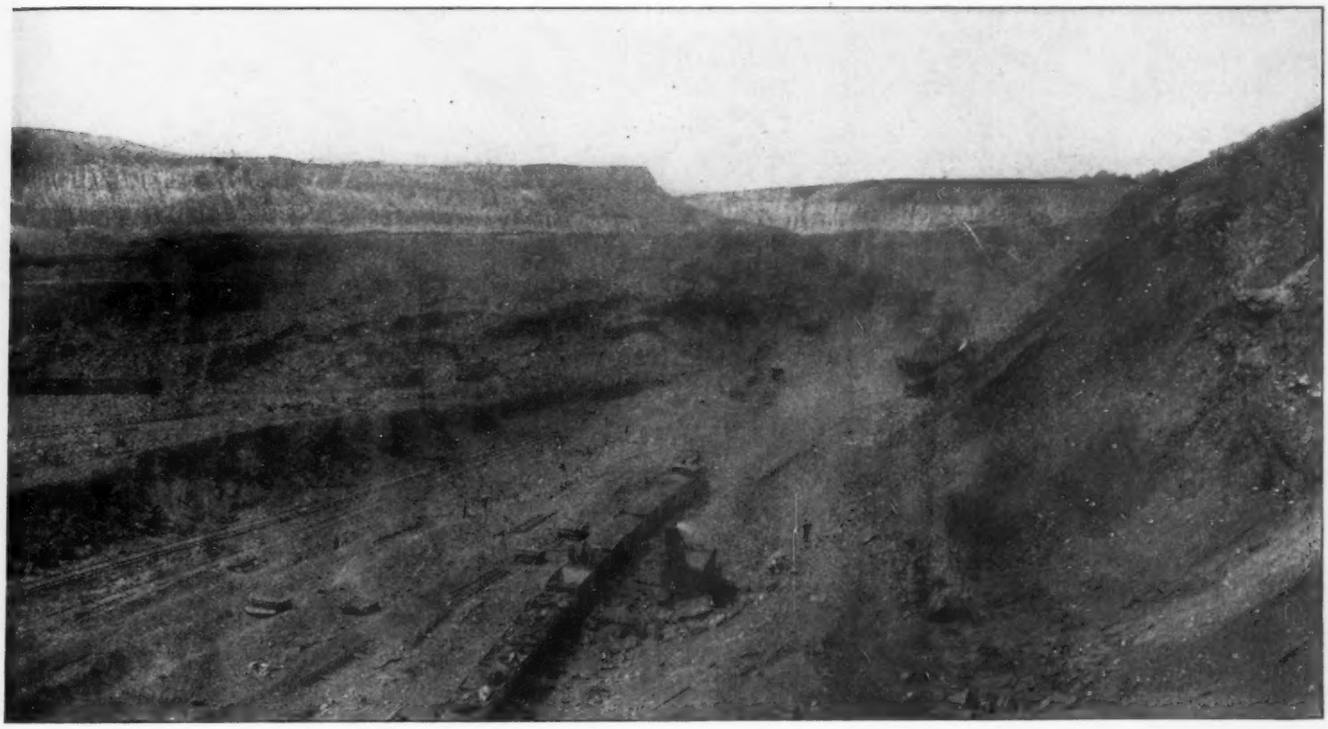
"In addition, the Great Northern properties are not in a position to ship any exceptional tonnage during the coming season. The ore holdings of the Great Northern are indeed vast but only a small fraction of the tonnage is developed to the shipping point. It is one thing to have over 400,000,000 tons in the ground and quite another thing to be in a position to ship even 1 per cent of it in a season. The largest open pit producers which were operated by the Steel Corporation under the Hill lease, such as the Leonard, North and South Uno, Dale, etc., have been, to a great extent, mined out to the point where steam shovel operations on a large scale are no longer profitable. These properties still contain large bodies of ore, but they will have to be reclaimed by scramming, milling, underground mining and other slower methods. It is to remedy this condition that the Great Northern is developing the large new Dunwoody and Hill Annex pits. The Hill Annex will not be in shape to ship at all in 1915 and the Dunwoody only a fraction of its eventual annual tonnage.

"Therefore, as far as 1915 is concerned, the Great Northern trustees would not be in a position to deluge the ore market, even if they were inclined to do so. They will have probably 2,500,000 tons available, a large proportion of which will remain in stockpiles, or in the open pits, unless the price of ore shows more strength than is now indicated."

In addition to the mines heretofore operated by the Steel Corporation, the Arthur Iron Mining Co. next year will be in a position to make shipments from two of its new mines, namely the Dunwoody near Chisholm, and the Smith mine near Hibbing. At the same time, stripping operations will proceed on the new Hill Annex mine near Coleraine, on the western end of the Mesabi range. Work on the new shaft which is being sunk near Buhl also will continue.

Extended reference to the Dunwoody property was made in our review last year. This mine, near Chisholm, is immediately east of the Monroe property controlled by the Steel Corporation. In fact, the Dunwoody ore body is a continuation of that in the Monroe. Up to date, the contractors have removed 5,000,000 cubic yards of overburden from the pit. The stripping has a maximum depth of 120 feet and an average depth of 100 feet, placing the mine among the deepest pits on the range. Stripping will continue throughout the winter. Four shovels were in operation up to Oct. 1, and three are in service at the present time. The pit at present is about a half mile long and 750 to 800 feet wide. The formation is such that no special arrangements for draining the pit are necessary, although it is expected that it will be advisable to install pumps of small capacity on the floor of the pit to take care of rain water, etc.

In connection with this mine, the Arthur Iron Mining Co. is building an extensive repair plant. The principal structure is a blacksmith shop, machine shop and carpenter shop under one roof, 200 feet long and 51 feet wide. The smith shop is equipped with a circular crane and will be provided with four forges, a steam hammer, punches, shears, etc. The machine shop



IRON MINING CO. IS ONE OF THE MOST INTERESTING GEOLOGICALLY ON THE RANGE

will be provided with the customary tool equipment. Adjacent to this building, a 40 x 80 foot warehouse and a boiler and engine house have been erected. The buildings are fireproof throughout with steel frames and brick walls. In addition to the repair plant, 18 dwelling houses have been built for the mine employes. It is the intention of the Arthur Iron Mining Co. to make its range headquarters at the Dunwoody mine and to take care of all the winter repair work at this point.

In the Leonard pit some stripping is being done to uncover ore for shipment next season. In general, however, this pit has been mined out to the point where steam shovel operations on a large scale are no longer feasible. The Dale property near Hibbing, also has been reduced to the scramming stage. In the North and South Uno pits enough ore remains for steam shovel operations for a season, after which the remaining tonnage will have to be recovered by other methods.

At the Thorne property near Buhl, where 250,000 tons of ore are available, a shaft has been sunk to a depth of 57 feet and work on mining out the ore will commence early in 1915.

The Smith mine near Hibbing is all stripped ready for shipment. The stripping is comparatively shallow, the average depth being 25 feet. The pit is about 250 feet wide and extends diagonally across the 40-acre tract. The mine contains somewhat less than 1,000,000 tons of high grade ore. The Mississippi, Harold, Leonard No. 2 Dale and North Uno mines are in full operation, the ore being placed in stockpiles. These are all underground properties.

Table II.

ORE IN STOCK, MAY 1, 1914.

County.	Tons.
St. Louis	8,698,233
Itasca	518,657
Lake	71,541
Crow Wing	227,575
Total	9,516,007

On the western end of the range, a contract has been let to A. Guthrie Co. to strip 8,500,000 cubic yards from the Hill Annex mine. Eventually, this will become one of the largest properties in Minnesota. A large proportion of the ore is sandy and concentration by washing will be necessary. Plans have been made for the construction of a two unit washing plant on Pinacia lake. The dykes, approaches, fills, etc., for this plant are being constructed by the stripping contractor. The Hill Annex property will not be in shape for shipment until the season of 1916. Although, as mentioned above, work on the Dunwoody mine is incomplete, considerable ore could be shipped from this property during 1915 if desired. With the conclusion of the stripping at the Dunwoody, involving the removal of 7,500,000 cubic yards, approximately 8,000,000 tons of iron ore will be available for steam shovel mining. The Great Northern engineers estimate that this work will cost $2,000,000. At the Smith mine it is estimated that an expenditure of $120,000 will make 600,000 tons of ore available.

The Dean-Itasca mine, formerly know as the Whiteside, will be in a position to produce ore in 1915. A portion of this property has been leased to Tod-Stambaugh & Co., Cleveland. The amount of the stripping contracted for was 3,000,000 cubic yards to be completed by July 1, 1915. This work is still in progress under the direction of the Arthur Iron Mining Co. With the ultimate removal of 4,250,000 yards, it is estimated that approximtely 5,000,000 tons of ore will be uncovered in this mine.

CANISTEO MINE NEAR COLERAINE, A STEEL CORPORATION PROPERTY

In August, 1913, a mining lease was executed by the Great Northern trustees in favor of Butler Bros. of St. Paul, on land in sections 6 and 7 and township 56, range 22, and section 1, township 56, range 23. The terms of this lease are interesting. The Great Northern trustees are to receive at their option either 30 per cent of the price at which ore is sold by the lessee, freight, marine insurance and selling commission being deducted, or 30 per cent of the ore produced by the lessee, the quality of which will be taken into account and the tonnage adjusted on a basis of iron units determined by analysis. This lease provides for a minimum royalty on 25,000 tons in 1914-15, 50,000 tons in 1916-17, and 100,000 annually thereafter. The

lease comprises 2,127,563 tons of ore in accordance with the latest figures of the Minnesota tax commission. Butler Bros. have developed the property nearly to the shipping stage, and also have erected a one unit washing plant a short distance west of Nashwauk.

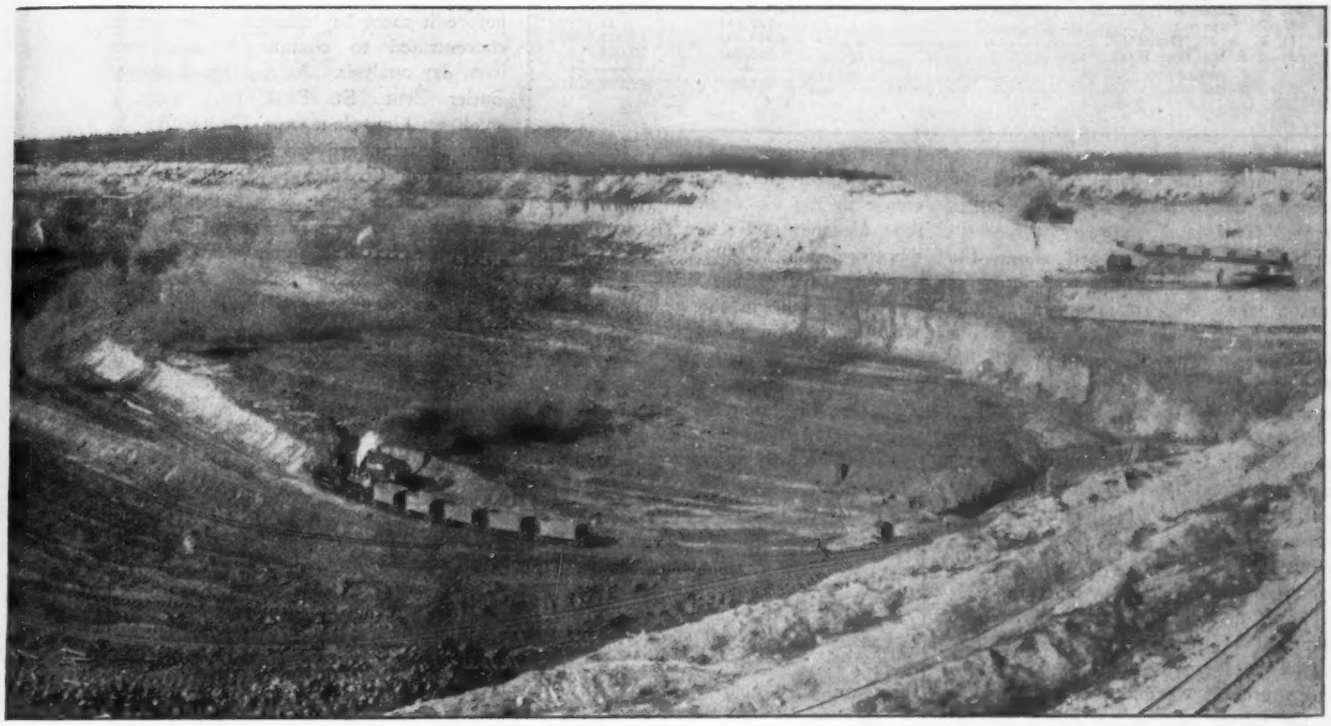
Some of the properties controlled by the Great Northern trustees, are held under lease from the Northwestern Improvement Co., a subsidiary of the Northern Pacific railway. This lease was surrendered Jan. 1, 1915. The land involved contained considerable undeveloped ore together with portions of the North and South Uno mines which have shipped nearly 6,000,000 tons up to date, and the Dale mine which has shipped 3,154,950 tons. It is not known at the present time what the Northwestern Improvement Co. will do with the properties which have thus reverted to it, but it is improbable that the Northern Pacific will attempt any mining operations on its own initiative.

For two years, the Oliver Iron Mining Co. has been developing new properties to replace those relinquished by the cancellation of the Hill lease and disposed of in other ways. This company, therefore, has more ore in condition for immediate mining and shipment at present than ever before in its history and in addition the reserves have been carefully maintained. There is no foundation, therefore, for the belief that the Corporation will buy ore from the Great Northern trustees, at least for some time to come.

In addition to large mines and reserves on the old ranges, the Oliver company is developing nine new mines on the Mesabi range, including the Graham and Vivian near Biwabik, the Wanless, Deacon, Minnewas, Shiras and Sullivan mines near Virginia, the Philben near Hibbing, and the Duncan near Chisholm. The foregoing are all underground properties, containing varying amounts of ore aggregating several million tons. The Shiras, Minnewas, Deacon, Wanless, Duncan, Graham, and Vivian made their initial shipments in 1914. The tonnages are given in Table V. In addition, tremendous reserves are available in the open pits around Hibbing, particularly in the Hull-Rust, Sellers, Burt and Day mines. The Oliver company also has considerable ore in stock particularly in the Chisholm district and on the Vermillion range. The new underground mines have been furnished with the most permanent equipment. The shafts are provided with reinforced concrete sets and concrete lagging made at the central plant at Hibbing. The engine houses, drys and other buildings on the surface are concrete block construction. The head frames are steel, specially equipped with safety appliances.

In addition to developing new mines mentioned above, the Oliver company is engaged in draining Carson lake west of Hibbing for the purpose of reclaiming 4,000,000 tons of ore. The lake bed is being filled with material stripped from the Sheridan mine. The details of this interesting piece of work will be published in the next issue of THE IRON TRADE REVIEW.

The stripping operations of the Oliver Iron Mining Co. have been reduced to an unprecedented minimum this winter. At present, only two shovels are operating, one on the Sheridan property at Hibbing, and the other in the Canisteo pit near Coleraine. A fair proportion of the underground mines are operating on reduced schedules, usually one shift per day. In the Eveleth district, the Oliver company is operating the Leonidas and Spruce mines and is continuing the development of the Minnewas property. The Minnewas shaft is 150 feet in depth.



THAT HAS FURNISHED MILLIONS OF TONS OF WASHABLE ORE

In the Virginia district there is a fair amount of activity, owing to the fact that several new properties are undergoing development, including the Deacon, Wanless, Shiras and Sullivan. Also, on account of a short lease, the Alpena mine is going at a good rate. The Prindle too is in operation. Altogether, the Oliver company has about 900 men employed underground in the Virginia district. Three shifts are working at the Alpena. Most of the Alpena ore, however, is being placed in stockpiles for future shipment. The shafts at the new mines are from 130 to 200 feet in depth.

The Hibbing district furnished about 2,400,000 of the 6,000,000 tons taken from the Hill mines by the Steel Corporation. Operations in this district

therefore, on properties not controlled by the Great Northern were extremely limited. The great Hull-Rust pit shipped only 447,689 tons as contrasted with over 3,000,000 tons in 1913. The Sheridan property, north of Hibbing, which is being stripped by the Oliver company, contains approximately 4,400,000 tons of ore. The pit will be about three-quarters of a mile long and the stripping will average about 30 feet in depth. The land embraces three 40-acre tracts. As mentioned above, the overburden is being dumped into the Carson lake. One steam shovel will be in operation at this property throughout the winter. The development of the Philben mine is proceeding and it will be ready to ship in 1915.

In the Chisholm district, the Oliver Iron Mining Co. developed the Duncan mine to a point where it shipped a little over 5,000 tons of ore during the past season. The shaft is 220 feet in depth. About 500 men are at work underground in this district.

The Canisteo, Holman, Judd, North Star and Hill mines, in the Coleraine district at the west end of the range, were operated during the past season by the Oliver company. About 250,000 yards were stripped from the Octurno property near Coleraine.

Ore Loading Machines

Some further development in machines for loading ore underground were made during the past season. Three types of machines are now available. The first type, as developed by the Myers, Whaley Co., Knoxville, Tenn., was described in THE IRON TRADE REVIEW, July 30, 1914. The second type, also mentioned in THE IRON TRADE REVIEW, has been designed by Nels Flodin of the Lake Shore Engine Works, Marquette, Mich. Bruce Middlemiss, superintendent of the Morton mine near Hibbing, also has developed a loading machine which is of particular interest because it is designed especially to fit Mesabi range conditions. The machine is short and low. The ore is handled by a large hoe, rather than with a shovel or dipper.

For the first time, the estimates of ore on the Mesabi range, prepared by the Minnesota tax commission, show a decrease. As given in Table IV the remaining tonnage of merchantable ore in the ground Dec. 31, 1914, was 1,397,910,482 tons, compared with 1,406,499,614 tons Dec. 31, 1913. The decrease in the visible supply of ore on the Mesabi and Vermillion ranges, therefore, is 8,589,132 tons. This amounts to 0.06 per cent of the ore estimated to be in the ground on Dec. 31, 1913. It, therefore, is relatively insignificant, but it indicates that the tremendous shipments of the past few years are beginning to tell on the reserves. Of course, during the past season there was practically no exploration work and very little drilling at any point on the range. In a more active season, sufficient new ore might yet be found to make up the losses in the visible supply.

In connection with figures regarding ore reserves, it should be borne in mind that a very large tonnage in the western end on the Mesabi range must be concentrated by washing before it is available for shipment. As is well known, considerable development in the erection of concentrating plants already has taken place. During the past season the Oliver Iron Mining Co. shipped 1,574,835 tons of concentrates from its Trout lake plant. The International Harvester Co., which operates a one unit plant near Nashwauk, shipped 229,608 tons of concentrates. The results obtained from the latter plant were particularly satisfactory, the iron recovery being 63 per cent with from 9 to 10 per cent water in the concentrate. The moisture in the raw ore amounts to about 14 per cent. The ore is delivered to the bins at the International Harvester Co.'s plant at O'Brien Lake, by a 36-inch conveyor belt which runs 240 feet per minute on a 19 degree angle. It has been found that the belt will handle about 625,000 tons of ore before it must be replaced. The ore is concentrated to contain 60 per cent iron, dry analysis. As mentioned above, Butler Bros., St. Paul, have built a small washing plant near Nashwauk. It is of the standard type. The Cleveland Cliffs Iron Co. also is considering the erection of a plant in connection with the Crosby mine in the same district.

At the La Rue mine at Nashwauk operated by M. A. Hanna & Co., Cleveland, an experimental washing plant was constructed and tried out during the past season. About 25,000 tons of ore was treated and the results are said to be successful. The plant was designed to use less water than the so-called standard plants. It includes a Woodbury jig operated in connection with a log washer and a Wetherbee concentrator.

M. A. Hanna & Co. operated the ore dryer at the Brunt mine, near Mountain Iron. It handled 130,000 tons of ore, this being about 50 per cent of its capacity. The moisture in the ore was reduced from 18 to approximately 8 per cent.

In addition to wet and sandy ores, the Mesabi range contains almost in-

Table III.

SHIPMENTS BY PORTS AND RAILWAYS.

	1914. Gross tons.	1913. Gross tons.
C. & N. W., Escanaba	2,887,132	4,257,696
C. & N. W., Ashland	2,605,275	3,505,838
C. M. & St. P., Escanaba	777,319	1,141,748
D. S. S. & A., Marquette	479,950	1,000,434
L. S. & I., Marquette	1,275,776	2,137,183
M. St. P. & S. Ste. M., Ashland	758,144	832,392
M. St. P. & S. Ste. M., Superior	721,662	696,338
G. N., Superior	10,450,522	13,060,811
N. P., Superior	137,564	31,194
D. M. & N., Duluth	6,318,291	12,331,126
D. & I. R., Two Harbors	5,610,262	10,075,718
Total	32,021,897	49,070,478

Table IV.

ORE RESERVES AND ASSESSED VALUES.

Mesabi and Vermillion Ranges in St. Louis, Itasca and Lake Counties.

Year.	Remaining tonnage.	Tonnage valuation.	Total valuation, tonnage and mineral lands.	Shipments, tons.
1906	.....	$.....	$ 64,486,409	25,611,384
1907	1,191,969,757	186,085,290	191,706,682	29,180,975
1908	1,193,188,959	174,263,632	180,210,693	18,098,894
1909	1,310,190,194	199,008,838	204,526,526	29,284,495
1910	1,347,596,291	220,423,038	224,669,845	30,413,963
1911	1,367,457,803	231,617,949	235,771,506	23,368,719
1912	1,401,340,743	254,002,774	259,418,277	33,892,390
1913	1,406,499,614	255,122,823	260,622,823	35,605,243
1914	1,397,910,482	264,553,874	270,603,874	*24,000,000
				249,456,064
	Cuyuna Range in Crow Wing County.			
1914	70,857,865	5,940,526	6,005,776	*1,000,000
Prior	.....	.....	.....	1,186,401
Total				252,642,465

*Estimated prior to Nov. 1.

Table V.

Shipments From Principal Minnesota Mines 1913-1914

These figures are preliminary and approximate and are presented in advance of the complete, corrected figures which will appear in a later issue of THE IRON TRADE REVIEW.

Mesabi Range.

Oliver Iron Mining Co.

Hibbing District:

Mine.	1914. Gross tons.	1913. Gross tons.
Hull-Rust	447,689	3,457,608
Burt-Pool-Day	213,432	622,951
Winifred	10,469	43,109
Mace	160,815	140,953
Harold	489,088	92,054
South Uno	944,145	1,202,341
Dale	423,711	621,415
North Uno	90,088	381,632
Mississippi	507,670	122,972
Mahoning (O. I. M. Co.)	242,573	.....

Virginia District:

Alpena	1,103,610	1,705,131
Missabe Mountain	5,347	321,835
Shiras	5,206	.....
Fay	27,673	.....
Union	123,316	286,934
Prindle	12,393	.....
Minnewas	5,798	.....
Deacon	88	.....
Wanless	5,040	.....

Chisholm District:

Leonard-Glen	2,135	.....
Leonard-Burt	21,199	2,862
Leonard Pit	2,060,243	1,253,367
Leonard No. 2	624,989	
Chisholm	399,555	641,788
Clark	393,765	402,893
Duncan	5,177	.....

Canisteo District:

Canisteo	1,051,893	1,099,727
Holman	407,222	751,422
Judd	95,416	103,495
North Star	90,054	.....
Hill	592,685	855,965

Adams District:

Adams	249,557	1,580,196
Leonidas	232,438	.....
Hull Forty	36,912	.....
Spruce	488,897	544,876
Norman	261,068	276,732

Fayal District:

Fayal	673,669	1,257,430
Genoa-Sparta	476,899	1,141,673

Biwabik District:

Graham	229,940	100,289
Vivian	14,993	9,093

Pickands, Mather & Co.

Elba	147,797	126,236
Minorca	85,541	90,837
Corsica	100,000	225,140
Scranton	20,205	227,270
Albany	227,766	345,162
Utica	260,007	352,932
Cyprus	45,205	82,121
Troy	.....	70,748
Belgrade	155,012	.....
Malta	1,300	93,632
Mohawk	35,049	171,849
Adriatic	74,911	110,534
Hudson	127,526	240,513
Bangor	91,189	119,705
Virginia	31,233	391,109

Republic Iron & Steel Co.

Mine.	1914. Gross tons.	1913. Gross tons.
Franklin	28,885	51,760
Monica	46,922	62,032
Pettit	120,868	131,864
Schley	16,396	202,477
Kinney	347,456	396,394
Union	244,436	286,934

M. A. Hanna & Co.

Sliver	197,041	298,006
Wacootah	36,839	43,459
Hanna	83,939	264,318
La Rue	24,699	172,337

Joseph Sellwood and International Harvester Group

Hawkins	232,331	568,919
Agnew	108,558	101,549
Adriatic	74,905	110,534
Cyprus	45,199	82,121
Pearson	.....	104,180
Perkins	18,182	120,012

Rogers-Brown & Co.

Susquehanna	906,895	904,019
Iroquois	14,334	111,159

Shenango Furnace Co.

Shenango	546,519	794,911
Webb	151	236,579
Whiteside	242,995	76,897

Jones & Laughlin Steel Co.

Lincoln	207,250	215,957
Grant	111,442	687,987
Fowler	12,363	72,078
Leetonia	551,238	501,248
Meadow	38,750	25,106

Inland Steel Co.

Laura	198,665	184,530
Grace	98,667	122,110

Corrigan, McKinney & Co.

St. Paul	.....	1,375
Stevenson	89,899	634,656
Commodore	372,796	484,188

Miscellaneous Independent Mines.

Miller	297,379	344,547
Ruddy	15,215	35,242
Mahoning	1,211,650	1,515,428
Williams	.....	76,703
Woodbridge	70,725	163,757
Cavour	16,694	118,404
Biwabik	252,701	300,924
Crosby	.....	219,065

Vermillion Range.

Pioneer	282,563	520,124
Sibley	74,868	249,255
Savoy	74,543	74,971
Soudan	74,979	100,885
Zenith	424,124	433,603

Cuyuna Range.

Armour No. 1	.....	105,087
Armour No. 2	.....	175,665
Kennedy	188,209	267,023
Thompson	178,152	47,651
Cuyuna-Mille Lacs	40,000	24,434
Cuyuna-Duluth	40,000	.....
Barrows	47,349	9,089
Iron Mountain	500	.....
Rowe	120,000	.....
Pennington	.....	101,136

calculable quantities of low grade iron bearing material which at some future date might be utilized for the manufacture of pig iron. Looking in this direction, some interesting experiments were made at the plant of the American Ore Reclamation Co., Birdsboro, Pa., on a shipment of 1,500 pounds of a typical Mesabi range paint rock containing 40.5 per cent iron in its natural state. Although the results of these experiments were somewhat indeterminate, they are of interest in showing the efforts that are being made to recover various classes of iron bearing material. The details of the work on paint rock were given in the June 18 issue of THE IRON TRADE REVIEW.

The Minnesota tax commission completed the equalization of the assessment of the iron ore tonnages and mineral lands in the Mesabi, Vermillion and Cuyuna ranges for 1914 late in November. A general raise of 5 per cent was ordered and made upon all mined and unmined ore and upon unplatted mineral land in St. Louis county and 10 per cent upon all unplatted land in Itasca county. The details of the revised assessment are given in Table IV. The tax commission is of the opinion that the iron ores of the Mesabi and Vermillion ranges are now on a basis of 50 per cent of true and full value in compliance with the new basis of valuation required in the tax law effective May 1, 1914.

Taxes for state purposes on the iron ore industry in Minnesota are not burdensome, but the local county and village taxes, particularly the latter in some instances, are becoming extremely heavy. Blessed with taxable resources far beyond the dreams of avarice, there is no doubt that many of the towns on the iron ranges have been led to indulge in unwarranted extravagance in the conduct of their municipal affairs. In villages ranging from 5,000 to 10,000 population, miles of streets have been paved in the most expensive and permanent manner, suitable for the traffic of a Broadway or a State street. Automobile fire apparatus has been purchased without stint and thousands of expensive ornamental lamp posts have been installed on the village streets. As a result, some of the towns, Chisholm for instance, have spent considerably more than their already princely incomes and are now face to face with a heavy municipal debt. Unregulated expenditures of this character undoubtedly have placed a handicap on the development of legitimate mining enterprises, owing to the burdensome nature of the resulting taxation in many cases. It is conceded on all sides that the range towns are entitled to all the advantages of modern municipal improvements, but at the same time the conviction is growing that some supervision should be exercised over the expenditures of a number of the communities.

The amount of ore in stockpiles at the mines is of scarcely less interest than the tonnage of the reserves in the ground. The volume of ore in stock is a measure of the condition of trade. Stockpiles also form a reservoir from which ore may be drawn for quick shipment in case of a sudden increase in demand. As given in Table II, the Minnesota tax commission estimated that there were 9,516,007 tons in stock on the Minnesota ranges May 1, 1914. Undoubtedly at the present time, this figure is considerably in excess of 11,000,000 tons, due to accumulations at underground mines since the close of navigation and also because considerable ore mined during the open season was not shipped owing to market conditions. In the Chisholm and Virginia districts, there are particularly large quantities of ore in stock; at the former center it is estimated that the Oliver Iron Mining Co. has 700,000 tons on hand.

The conditions which have existed during the past year naturally have resulted in a tremendous outflow of common labor from the mining districts. At the same time, the scale of wages has been reduced, although it may be said to the credit of the Steel Corporation that it has not joined in this movement. The Oliver Iron Mining Co. is still paying common surface labor at the rate or $2.25 per day and underground labor at the rate of $2.40 per day. In general, however, surface labor is now being paid $2.00 per day and

Table VI.

SHIPMENTS BY PORTS AND MONTHS.

1913.

Month.	Escanaba.	Marquette.	Ashland.	Superior.	Duluth.	Two Harbors.
April	217,029	37,494	53,481	252,875	160,372	145,136
May	738,158	489,547	681,460	2,047,396	1,939,848	1,387,803
June	845,414	532,736	774,761	2,377,078	1,895,728	1,548,727
July	858,696	496,725	754,329	2,396,064	1,938,716	1,759,886
August	964,288	598,861	809,597	1,519,109	1,957,239	1,835,191
September	673,591	418,242	485,174	2,225,802	1,938,823	1,518,030
October	617,119	369,293	497,952	2,040,651	1,689,427	1,311,661
November	485,102	194,720	281,476	929,368	810,973	569,319

1914.

Month.	Escanaba.	Marquette.	Ashland.	Superior.	Duluth.	Two Harbors.
April	110,729	.....	40,838	62,338	.....	55,781
May	385,188	121,873	300,928	1,673,269	734,090	636,715
June	580,103	262,075	541,315	1,997,895	1,045,786	1,075,193
July	664,721	297,413	533,744	1,956,911	1,169,410	1,162,315
August	724,951	368,430	662,951	1,886,418	1,203,081	1,023,646
September	553,959	335,928	662,141	1,901,422	1,126,532	851,325
October	421,341	265,861	487,829	1,442,216	918,144	707,001
November	*223,459	104,147	133,673	389,279	121,248	98,286

*Includes 1,411 tons shipped in December.

Table VII.

APPROXIMATE SHIPMENTS FROM GREAT NORTHERN ORE PROPERTIES.

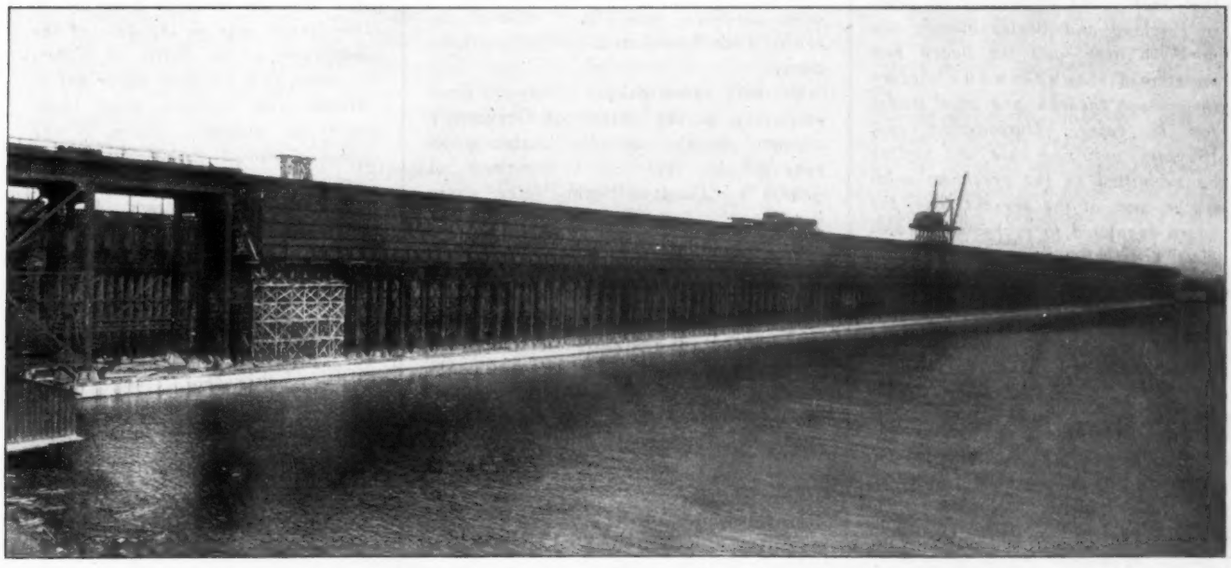
Name and Nearest Town.	Legal description section, township and range.	Shipments 1914.	Shipments 1913.	Total to Jan. 1 '15.
Leased by U. S. Steel Corporation to Jan. 1, 1915.				
Fay, Virginia	6, 58, 17	27,673	296,059	608,810
Leonard, Chisholm	28, 58, 20	2,685,232	1,253,479	9,079,494
Mississippi, Hibbing	23, 57, 22	507,670	122,984	1,268,571
North Uno, Hibbing	2, 57, 21	90,088	381,632	1,838,007
South Uno, Hibbing	2, 57, 21	944,145	1,202,341	3,976,288
Dale, Hibbing	3, 57, 21	423,711	621,496	3,154,950
Mace, Hibbing	7, 57, 21	160,815	141,242	579,127
Harold, Hibbing	11, 57, 21	489,088	92,060	1,077,954
Hill, Coleraine	17, 56, 23	592,685	846,662	4,980,335
North Star, Coleraine	21, 56, 24	90,054	278,647	1,167,364
Walker, Coleraine	29, 56, 24	.....	.....	1,971,994
Miscellaneous		.....	.....	3,164
Totals		6,011,161	5,236,602	29,606,058
Leased to various independent companies.				
Mahoning (M. A. Hanna), Hibbing.	1, 2, 57, 21	1,211,650	1,515,428	18,902,346
Utica (Pickands Mather), Hibbing..	2 & 11, 57, 21	260,007	352,216	2,467,034
Leetonia (W. G. Pollock), Hibbing.	10, 57, 21	551,238	501,249	4,652,610
Stevenson (Cor. McKinney), Hibbing	7 & 8, 57, 21	89,899	634,656	12,819,759
Sweeny (O. I. M. Co.), Hibbing...	3 & 4, 57, 21	.....	.....	8,348
Total independents		2,112,794	3,003,549	38,850,097
Grand total		8,123,955	8,240,151	68,456,155

underground labor $2.25; in some instances the rate for work in the open pits has been scaled down as low as $1.75. The railroads are paying only $1.40 for the little track work which they are doing, and wages in the woods have been reduced to $13 per month, including board. Prices on various mining supplies are also materially lower, mine timber now being obtainable at 3½c per foot as contrasted with 4½c a year ago.

In addition to the outflow of unskilled labor, there has been a remarkable exodus of skilled miners. This latter movement is much more important than the shifting in the supply of unskilled labor. It is felt that when the mines resume there will be an acute shortage of skilled labor which will seriously interfere with the operation of underground mines.

Conditions on the Cuyuna range deserve special mention on account of some unfortunate circumstances which have been connected with that district. In common with other new mining districts, the Cuyuna range has been obliged to go through a wildcat boom period which it is now hoped is past. The harmful effects of this exploitation were increased through the promotion of a number of alleged manganese ore mines, in connection with the curtailment of the supply of ferro-manganese due to the war in Europe. During the year the Minnesota tax commission made a careful estimate of the tonnage and quality of the ore available on the Cuyuna range. The commission was confronted by estimates of from 400,000,000 to 500,000,000 tons or over, made by newspapers, promoters, alleged experts and speculators. One property alone was repeatedly reported to contain over 200,000,000 tons. Few of the operators or owners would, or indeed could, properly estimate their developed tonnage and the commission called for complete exploration and drill reports and mine maps. Then it made its own measurements or calculations to determine all grades and classes of ore. The result was that the commission has determined that there are 70,857,865 tons of merchantable ore, and 13,907,949 tons of low grade iron and manganiferous ore material on the Cuyuna range. No commercial manganese ore has been developed on the range. There is a considerable quantity of manganese, but it is so mixed with the iron formation as to make it a manganiferous iron ore material of no present metallurgical value. The tax commission placed an assessment on 13 active mines, or those about to become mines, on the range, containing 30,356,975 tons: on 19 properties of reserve ore of the first class, containing 27,066,558 tons; on 15 properties of reserve ore of the second class, containing 13,434,332 tons; on 35 properties containing 13,907,949 tons of low grade non-merchantable or non-mineable iron. The total assessed valuation of the ore tonnage and mineral lands of the Cuyuna range was placed at $6,005,776. This represents 50 per cent of the true value of the property.

In spite of the conscienceless manner in which some properties on the Cuyuna range have been promoted, tangible legitimate progress is being made. This is attested by the shipment records of the past three years. In 1911 the Cuyuna shipped 147,431 tons; in 1912, it forwarded 305,111 tons; in 1913, the shipments rose to 733,021 tons and in 1914, in spite of bad business conditions, they increased to 859,226 tons. The older mines on the range, including the Kennedy, the two Armours, the Thompson, Rowe and Pennington, are now on a fully developed basis. Among the new properties which are being developed, mention should be made of the Croft property controlled by John A. Savage, Duluth. Shaft sinking is in progress at this mine and will be continued throughout the winter. The Brainerd-Cuyuna shaft at Brainerd is said to be down over 60 feet. At the Rowe mine, where hydraulic stripping operations were continued during the past season, a steam shovel now is operating. M. A. Hanna & Co. have given up the lease of the Barrows mine west of Brainerd, after shipping 56,438 tons from the property. Difficulties were encountered from the intrusion of seams of quartz in the ore deposit. The quartz is crushed when the ore is blasted and cannot be removed except by washing. Similar quartz veins are said to have been discovered in several other Cuyuna properties, materially interfering with the mining operations.



NEW D. M. & N. ORE DOCK AT DULUTH—THE LARGEST IN THE WORLD

We are advised that the fire at the Edison plant, in West Orange, N. J., did not damage the oxy-hydrogen plant which had been installed by the International Oxygen Co. This plant is producing oxygen and hydrogen as usual and the gases are being used in the storage battery building, which fortunately was not attacked by the fire.

When trying out a new brand of steel, it is better to do as the maker recommends, as one method will not fit all kinds, even if it has proved satisfactory on two or three.

Events in England

(*Continued from page 56.*)

any definite purpose on the part of the millowners, forced down production to a much greater extent.

On the whole, the experience of the year has tended to discourage faith in the potency of association either for good or ill. In addition to the experiences of the steel makers, and the tin plate makers, the Staffordshire makers of skelp had an experience which rather tended in the same direction. They felt obliged in the stress of competition, especially of continental material, to dissolve their association, after a continued existence of about 12 years. A period of price cutting followed until the war, when they put up their selling figures, as indicated above, to the extent of about $6.05 per ton: but this was done without the aid of any association machinery.

The Sheffield district is a kind of law to itself in times of war, and since the outbreak of hostilities its enormous activity has had a character of its own, owing to the vast scale on which war material, soldiers' equipments, army and navy cutlery, and such goods have been furnished. The city is a busy hive of industry, gathering to itself skilled workers from almost every part of the kingdom, and from many other industries. Very large extensions of works are taking place in that district. To a less extent, this applies to Newcastle, Durham and Barrow-in-Furness, where for months past steel workers and ship builders from other districts otherwise unable to find accommodation have found welcome and homely shelter with residents, who have offered the use of their homes as a sort of patriotic duty.

British steelmakers have been staggered at the extent of Germany's capture of the world's business, as revealed by the recent diversion of orders to Great Britain. For some months, the full effect of this was not seen, apparently because customers were using up stocks of German supplies, but toward the end of the year this kind of order was coming in a stream, the volume of which apparently increased. It was not only that we have been annually importing from Germany an enormous proportion of the 2,500,000 tons, but that huge inroads into neutral markets had apparently largely escaped notice, while British dominions and India were among our rival's best customers. It is now clear that Russia also has been an immense buyer from her great steel making neighbor. Only a month or two before the war, a large order for German locomotives was placed by a British railway, and it was notorious that Egyptian railways were furnished from German engineering shops. If Russia, in the same sweeping fashion as she has dealt with vodka, cuts off German steel supplies, there will be a big business for other steel making countries. Germany also has been an immense builder of general rolling stock. There will be a great amount of curiosity as to the measure of success with which Germany's desperate efforts after the war to recapture this business will be rewarded. Undoubtedly, sentiment for a time will restrict the re-flow of business into German channels; but British makers fully recognize that, in the long run, business is not controlled by sentiment, even when that sentiment has for its motive force the strongest patriotism. British makers also expect, with some justification in actual experience, that a considerable part of this business will be diverted to America.

At the close of the year the general improvement in trade led to some advance in shipping freights which it is recognized will add a little to the difficulties of American exports to Great Britain, though the Americans will of course be substantially unaffected in regard to shipments to neutral markets in competition with Britain makers where the steel is conveyed, as in many cases it will be, by British vessels.

Preventing War in Industry

In a time of international strife it may be apropos to recall how much more successful have been the captains of industry than the controlling heads of politics, in maintaining the peace. At the annual meeting of the Midland Wages Board held in March, the chairman, George Macpherson, pointed out that that board controlled 66 firms in England and Wales outside the northern area, and the board had maintained continuous peace throughout the iron and steel trades for 38 years. During the past 15 years, only one case had had to be submitted to the presiding arbitrator, and, at the present time, the board regulated, to everybody's complete satisfaction, the wages of 30,000 workmen. It is to the credit of the iron and steel trades that the British wages boards have been made the models for any number of wage regulating instruments both in England and abroad; whilst the influence of these organizations is clearly seen in the framing of the trade boards act, a measure which has done a great deal toward the prevention of strikes, and the pacific regulation of wages in a number of British industries. The Midland board has practically now universal authority over all existing works within the area of its operations. It may be added that the boom wage of 1913, already referred to, was the highest since 1900. The board is still in the happy position of having a substantial and increasing financial balance to its credit.

Krupp's Visit Recalled

In view of subsequent events, it is a little startling to remember, that so recently as June last Herr Krupp, the head of the famous Essen gun-building firm paid a tour of inspection to the great armament firms of Great Britain. This was within six weeks of the outbreak of war, and it was noticed at the time that the dinner party given by Sir Robert Hadfield to Herr Krupp was on the date of the anniversary of the Battle of Waterloo when, as a Sheffield paper put it, "British and German guns thundered in unison." Herr Krupp visited Cammell Laird's works at Burkenhead, the Barrow-in-Furness establishment of Messrs. Vickers, the Ellswick works at Newcastle-on-Tyne, and the great works of Hadfields, Vickers, Cammels and Browns at Sheffield. During his stay, Herr Krupp was the guest of Sir Robert Hadfield.

It is perhaps hardly to be wondered at that this should have been since described as a spy visit. Herr Krupp seems to have made the tour of our armament factories, and to have been generously entertained everywhere. Whether he picked up any useful knowledge is probably best known to the visitor himself; though the captains of the British armament firms state that they took care to safeguard their secrets. Among the more cosmopolitan of British steelmakers the incident serves to emphasize the regret which certainly pervades the Iron and Steel Institute, which has all along been a synonym for international cordiality, that these friendly relations should have come to such a sudden and disastrous collapse.

Modern Steel Plant at Massillon

Description of New Works of Central Steel Co., Including 50-Ton Open Hearth Furnaces, Soaking Pits, Blooming Mill and Bar Mill

THE NEW open-hearth steel plant which is being built at Massillon, O., by the Central Steel Co., affiliated with the Massillon Rolling Mill Co. and the American Stamping & Enameling Co., is nearing completion. The works will be equipped to roll sheet bars and chrome-vanadium, chrome-nickel and other alloy steel billets. It is the intention to focus the activities of the organization on the production of metal for special purposes to fit particular specifications, rather than to operate the mill purely on a tonnage basis. The plant nevertheless has ample capacity. The output with three open-hearth furnaces will be 9,000 tons per month, but the mills and accessories are designed to take care of the output of twelve 50-ton open-hearths.

The preliminary plans for the works were prepared in February, 1914. About April 1 the grading, which amounted to 150,000 cubic yards, was started. The open-hearth pits, as well as the soaking pit foundation excavations, were dug with steam shovels and the first foundations were placed July 8, 1914. The open-hearth furnaces, of which there are three at present, the soaking pits and all buildings were completed recently. Some of the mill machinery is on the ground now and the plant is expected to be in operation by April 1, 1915.

One of the striking features of the plant is that it is driven throughout electrically. No steam or hydraulic power is included, as the electric power will be furnished partly by the Massillon Rolling Mill Co. and partly by the Massillon Electric & Gas Co. The power furnished by the Massillon Rolling Mill Co. is produced by a Westinghouse low pressure turbo-generator set. The turbine is run by the exhaust steam of the sheet mill engines and therefore power is generated at very low cost.

The site of the new steel plant is south of the Massillon Rolling Mill Co.'s building, between the Baltimore & Ohio, Wheeling & Lake Erie and Pennsylvania railroad tracks. It contains about 100 acres. Each one of the railroads will have switches directly into the yards of the Central Steel Co. The main railroad yards of the steel plant are located at the extreme southern end of the property. These yards contain the track scales, yardmaster's office and all tracks necessary to make up the trains for the different departments. All cars for the Central Steel Co. Massillon Rolling Mill Co. and the American Stamping & Enameling Co. will be handled in this yard.

Adjoining these yards is the stockyard building for the open-hearth plant. This building is 500 feet long by 90 feet center to center of columns. It contains three switching tracks which lead up an incline to the open-hearth floor. The track system for the stockyard is laid out in such a way that it is completely independent of any other tracks and therefore will be used for open-hearth purposes only. This avoids interference with any other switching necessary to serve other parts of the plant.

Ore bins and limestone bins have been omitted for the present, but will be installed later if found necessary in space which has been provided for them.

The open-hearth building, which is 563 feet 6 inches long and 135 feet wide, is located north of the stockyard, and space has been provided to lengthen this building to cover 12 open-hearth furnaces. The present building is large enough to contain seven furnaces of 50 to 60 tons capacity. Foundations have been put in at the present time for seven furnaces and three of them are being erected complete. The furnace building proper is 60 feet in width; on the west

FIG. 1—FIFTY TON OPEN HEARTH FURNACES UNDER CONSTRUCTION AT PLANT OF CENTRAL STEEL CO.

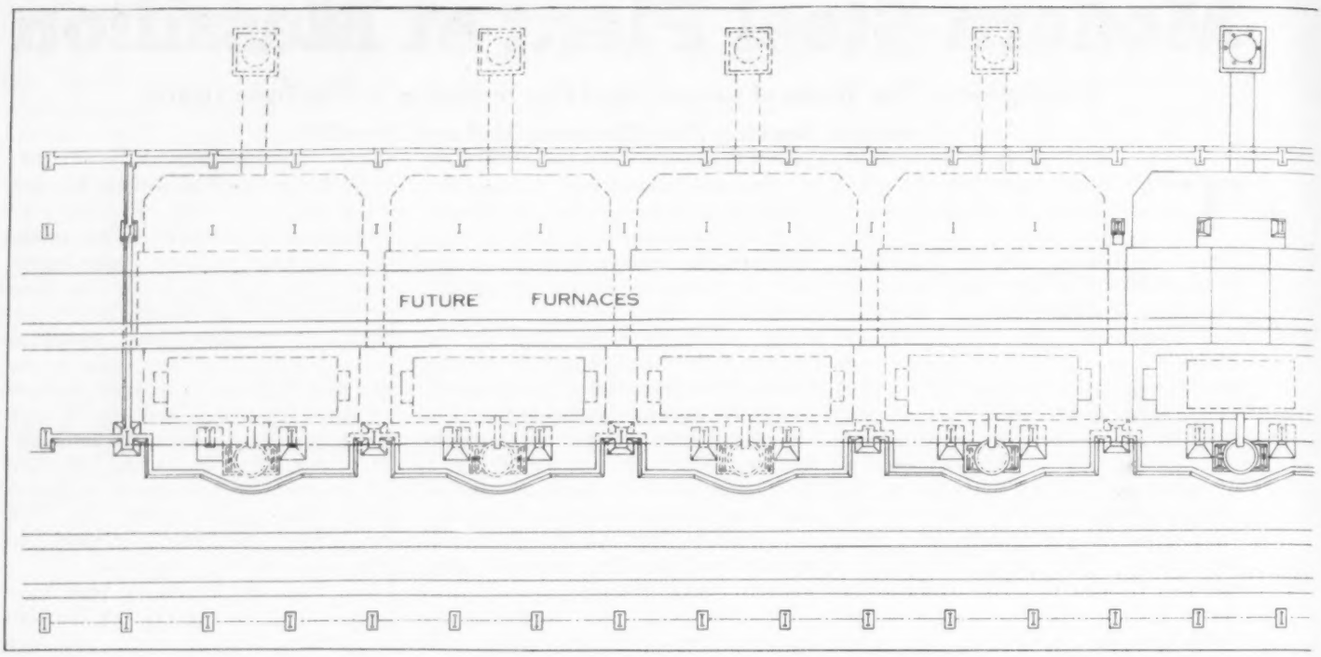


FIG. 2—PLAN OF OPEN HEARTH FURNACES AND SOAKING PITS—SPACE

side is a 20-foot leanto and on the east side a 55-foot pit building which makes the total of 135 feet mentioned above. The charging floor of the open-hearth is 6 feet above mill floor and yard level. The stock may be taken up on short trestles with slight grade, which are provided at either end of the building so that buggies can be handled both ways. The charging buggies are of standard design and contain four boxes each.

A high type of 7½-ton charging machine has been furnished by the Alliance Machine Co. The three open-hearth furnaces are being built by the S. R. Smythe Co., Pittsburgh. They are equipped with Knox water-cooled doors and a water-cooled port of special design has been incorporated. Three large doors 3 feet 6 inches wide and 2 feet 9 inches to the spring of the arch opening, are provided in the furnaces. The doors are operated by motors through a worm gear device built by the Youngstown Engineering Co., Youngstown, O.

The furnaces are stayed by heavy structural steel struts which are riveted at their base to the sub-structure and held by heavy rods at the top. The hearth proper is built into a heavy riveted steel plate pan which in turn is carried on heavy beams resting on brick piers located alongside of the slag chambers. This leaves a clear opening on the center of the hearth of 16 feet.

The overall dimensions of the furnace proper are 59 feet by 16 feet 3 inches, the inside measurement of the hearth being 32 by 14 feet. The slag chambers are heavily reinforced by a structural steel strut, and are 4 feet wide for air and 3 feet 9 inches for the gas. The checker work is located to the rear underneath the charging floor. The gas chambers are 23 feet

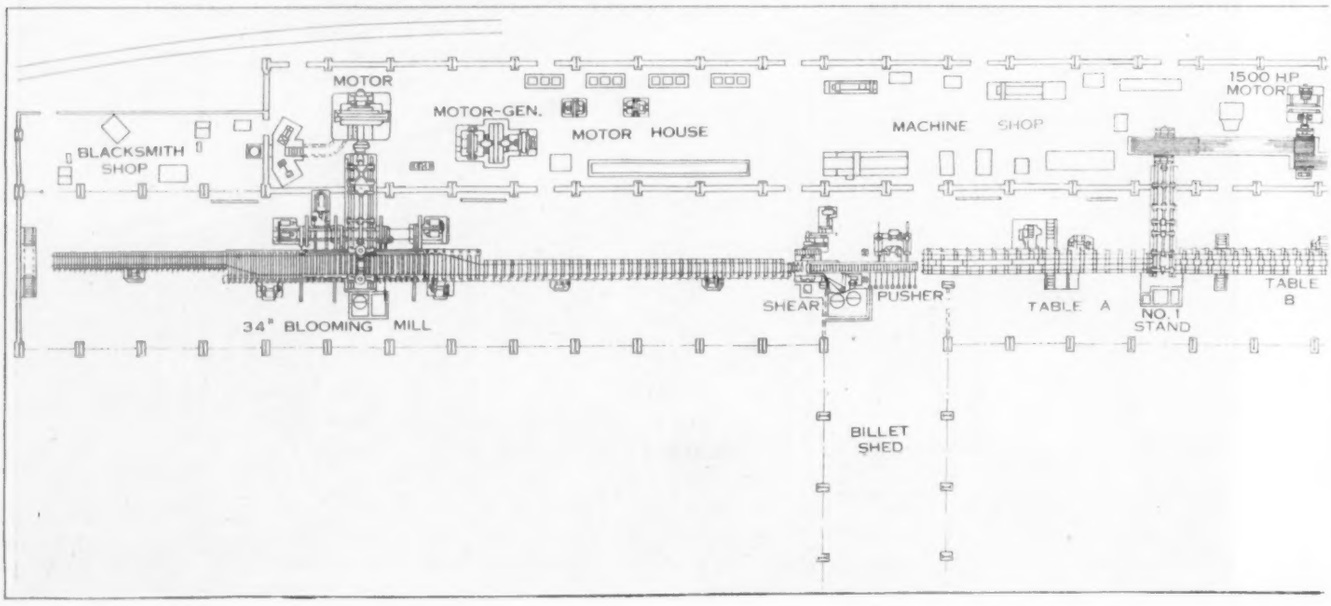
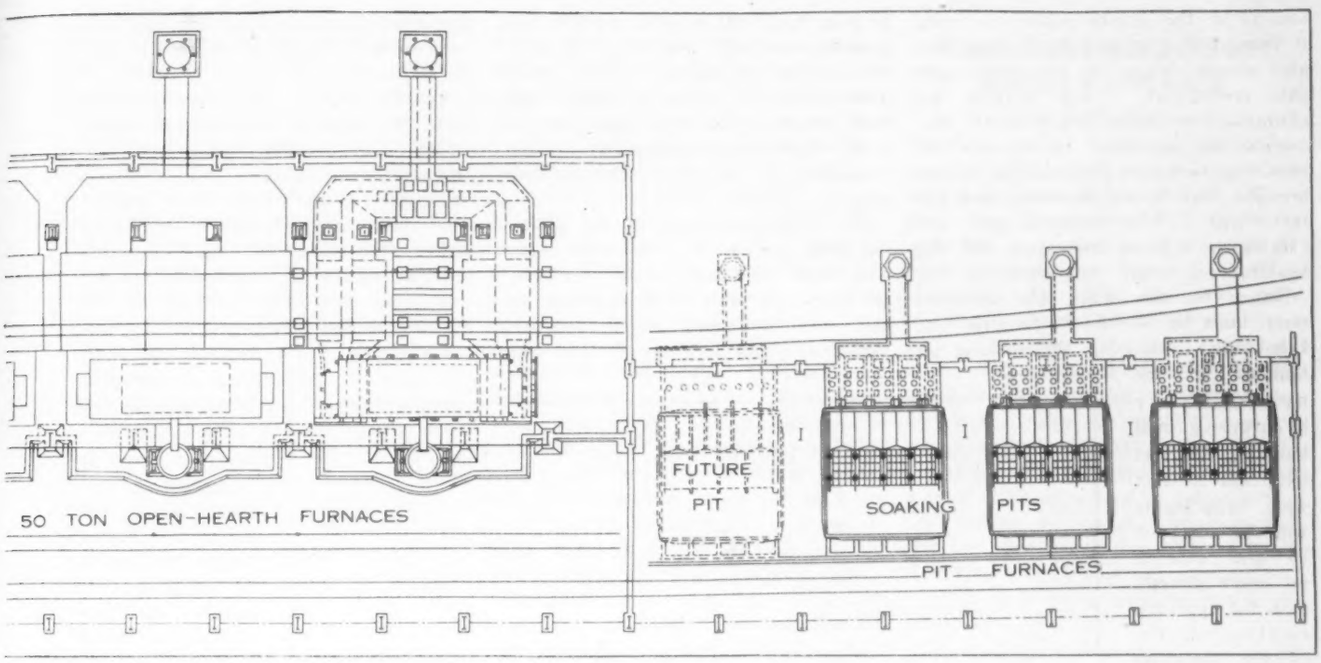


FIG. 3—LAYOUT OF BLOOMING MILL AND BAR MILL
On the ground the mills and furnaces

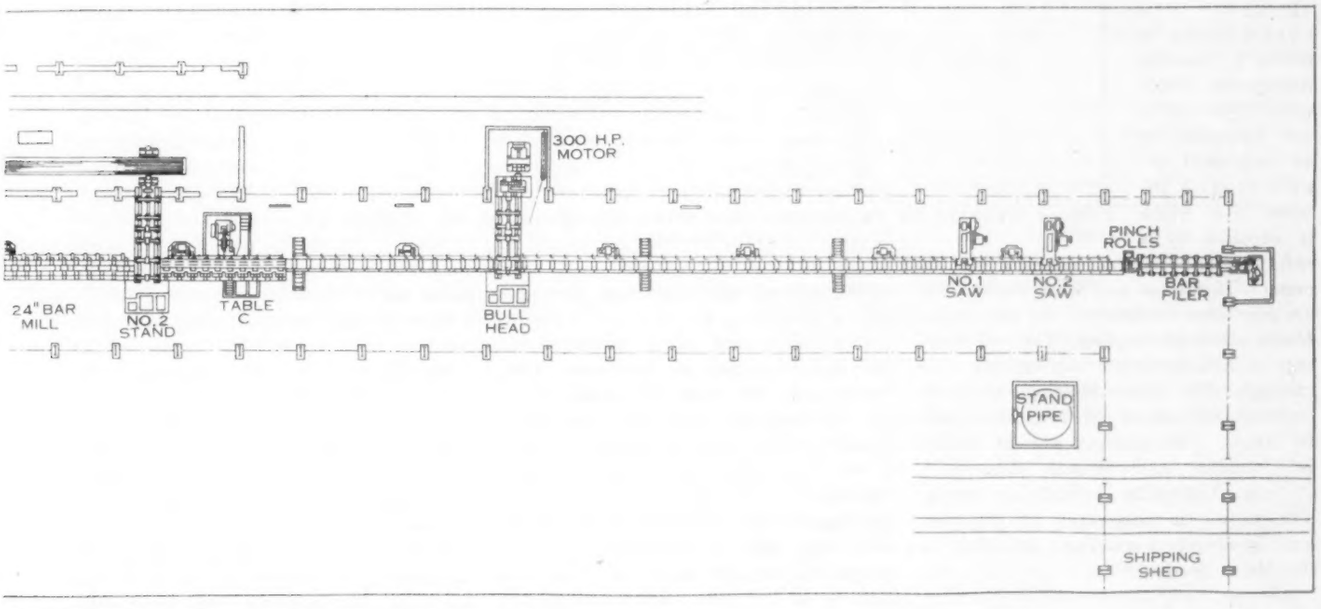


IS PROVIDED FOR SEVEN FURNACES AND FOUR PITS IN ONE UNIT

long, 6 feet 10½ inches wide and 17 feet 6 inches deep; the air chambers 23 feet long, 9 feet 10½ inches wide and 17 feet 6 inches deep. The checkers proper occupy a space of 1,898 cubic feet in the gas chambers and 2,725 cubic feet in the air chambers. The checker brick is of a special design. The stacks are 5 feet 9 inches diameter inside and 16 feet high.

Natural gas will be the fuel used in the open-hearth furnaces, although oil or producer gas can be employed. Space is provided for gas producers if such should be found necessary. In a like manner provision has been made for waste heat boilers. The product of the open-hearth furnaces will be handled by 100-ton four girder Alliance ladle crane, and also a 15-ton general service crane. Three platforms 122 feet 6 inches long each are provided along the east side of the pit. A double track runs the full length of the open-hearth pit and is connected by several cross-overs. The ladles, which were furnished by the Riter-Conley Mfg. Co., are 90 tons capacity. Special slag pots which will be used for drying ladles will be designed by the Central Steel Co. The ingot cars are of standard design, but will be provided with an automatic bar coupler; each car will carry three ingot molds.

At the north end of the open-hearth building one bay, 24 feet 6 inches, will be used for stripping ingots. One 100-ton Morgan electric screw stripper will serve this purpose. At the north end of the stripper bay are the soaking pits in a building 196 feet long and 55 feet wide, with a leanto the full length of the building 20 feet wide. The soaking pit furnaces, of which three are built at the present time, are located in the main building. All operating mechan-



AT PLANT OF CENTRAL STEEL CO., MASSILLON, O.
shown in Figs. 2 and 3 are continuous.

ism is in the leanto which prevents it from being injured by cranes and also avoids danger to the men using this mechanism. Each soaking pit contains four holes 8 x 6 feet. The covers are operated by motors by means of rack and pinions. The stacks are 3½ feet inside diameter and 120 feet high. The soaking pits are served by a 5-ton low type stiff leg soaking pit crane furnished by the Alliance Machine Co. The furnaces were built by the S. R. Smythe Co., Pittsburgh. Adjoining the soaking pit building to the north is the blooming mill building, 330 feet long and 55 feet wide. The ingots will be dropped by the soaking pit crane directly onto the approach tables of the of the blooming mill. No ingot cars or chairs are necessary on account of the convenient location of these tables which simplifies the operation. The blooming mill contains one 34-inch two-high reversing stand. It is of very heavy design on account of the special steel which will be made in the open-hearth plant. The housings are link shaped. The screwdown is driven by two 80-horsepower motors. The rolls are balanced by an individual accumulator the water for which is supplied by a motor driven pump. The lower and vibrating spindles are connected to the rolls and pinions by Mesta universal couplings. The roll housings as well as pinion housings are steel castings. The pinion housings are fully enclosed and splash oil lubrication will be used. The pinions are 34 inches in diameter and 48-inch face with 20-degree involute helical cut teeth. The motor is connected to the pinions by universal couplings furnished by the Mesta Machine Co.

The main mill motor, which was furnished by the Westinghouse Electric & Mfg. Co., will develop 640,000 foot pounds, and will run from 50 to 75 revolutions per minute normal speed. This motor is driven by direct current of about 600-volts generated in a fly wheel motor-generator set, also furnished by the Westinghouse company.

The approach tables of the blooming mill are 62 feet 4 inches long. The front mill table is 46 feet long; the rear mill table is 42 feet and the mill run out and shear approach tables are 108 feet long. The mill tables are of steel castings throughout.

The rollers are of a heavy design and are 14 inches in diameter. One front and one rear manipulator of the Wellman-Kennedy type are electrically driven and arranged in such a way that both may be mechanically connected or run separately. Manipulator fingers are provided on the front side only and are mechanically connected to one side guard, so they will always be in the right position to tilt the piece to be rolled. The electric control of the blooming mill has been worked out in an unusually careful manner.

At the end of the shear delivery table is located an 800-ton shear which is electrically driven and capable of cutting a 12 x 12-inch bloom or a 36 x 6-inch slab. The gag of this shear is operated by hydraulic power furnished by the blooming mill accumulator. Hydraulic power was used here on account of the difficult design necessary to do this mechanically. The clutch of this shear is operated by an electric motor by means of a cam. A gage is connected to the shear which will measure billets from 6 inches to 12 feet long. This gage is extremely heavy to avoid bending. A motor is provided to set the gage and also to lift the stop so billets may be run out onto the push-off table. The front rollers of the rear shear table may be dropped to allow crop end and cross cut billets to drop onto a chute which guides the pieces into buckets located in the pit on one side of the tables. The long billets which will not be used in the sheet bar mill are delivered by an automatic push off into a cradle located to one side of push-off table. Adjoining and at right angles to the main mill building, opposite the shear tables and crop chute, is a billet storage house 44 feet wide and 200 feet long. A 10-ton crane which is located in this building can run over the push-off table and crop chutes where it can pick up billets and crop ends and carry them into billet shed or load them into cars located on tracks in the billet shed. Conveyors are entirely eliminated.

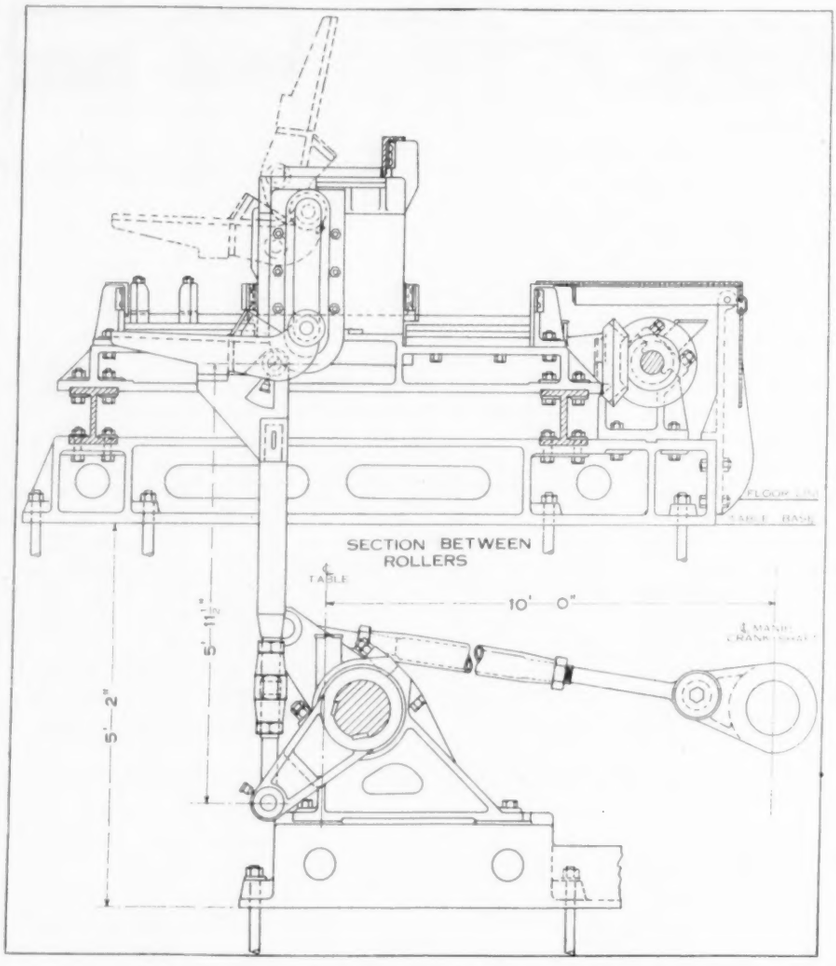


FIG. 4—DETAILS OF TWO-HIGH TABLE WITH MANIPULATOR AT RUNOUT END OF BAR MILL

Adjoining the blooming mill is the bar and billet mill housed in a building 572 feet long and 55 feet wide. The bar and billet mill consists of

two three-high 24 inch mills and one two-high 24-inch bull-head. These mills and also the bull-head tables, saw tables, saws and bar piler were built by the National Roll & Foundry Co., Avonmore, Pa. The mills are arranged in tandem position as shown on the accompanying drawing. The two three-high stands are served by two high tables to eliminate lifting and tilting tables and also to make the process of rolling practically continuous.

The bloom is delivered to table *A* from the blooming mill shear and enters a flat pass in No. 1 stand. After edging on the intermediate table *B* it enters the edging pass of No. 2 stand after which it is delivered to table *C*. At this point a manipulator lifts the billet onto table rollers on top of the main table. The former are driven by the friction of the lower rollers. It is obvious that the top rollers run in the opposite direction from the lower rollers and therefore deliver the piece into the top flat pass of No. 2 stand, after which it runs over the top rollers of the intermediate table *B* to the top pass in No. 1 stand, where it is delivered into a tilting trough on top of table *A*. This trough turns the piece 180 degrees and deposits it on the main rollers of table *A*, thereby reversing the direction of the piece and delivering it into the lower flat pass of No. 1 stand. From thence it goes over table *B* into the lower flat pass of No. 2 stand, which delivers it over table *C* to the bull-head tables. After passing through the bull-heads and over the bull-head delivery tables, the piece is run in front of the saws where it is cut into proper lengths and is then deposited by means of a pinch roller into a bar piler. This arrangement is designed and patented by W. T. Martersteck and built by Wm. Tod Co., Youngstown.

The two three-high stands are driven by a 1,500-horsepower alternating current motor, Westinghouse Electric & Mfg. Co. type, by means of a rope drive furnished by the Mesta Machine Co. The bull-heads are driven by a geared 350-horsepower Westinghouse motor.

The gears of the bull-head motor have cut helical teeth fully enclosed so as to be dust proof. Splash oiling is used. All the pinion housings are fully enclosed and have pinions with cut 20 degrees involute teeth.

Across the end of the main building is located the sheet bar shed which is 200 feet long. The crane in this shed runs over head of the bar piler and is thereby able to pick the bars out of this machine and deposit them in the shed or on cars. A shear table which is located at the end of the sheet bar shed delivers the bars to a shear located in the main building of the Massillon Rolling Mill Co. This enables the Central Steel Co. to deliver the sheet bars onto this table to be sheared for the sheet mill purposes without further transportation.

Adjoining the main building to the west in the form of a leanto is the motor house and machine shop building which is 462 feet long and 45 feet wide. This building is enclosed on the mill side by a 7-foot concrete wall. This building contains the large blooming mill motor and pinion housings, the motor-generator set, two 500-kilowatt rotary converters, transformers, switch board and other auxiliary electrical apparatus together with the machine shop, the 1,500-horsepower motor and the rope drive for the 24-inch mill. The structural work was furnished and erected by the Fort Pitt Bridge Co., Canonsburg, Pa.

The Central Steel Co. is incorporated with a capital stock of $5,000,000, half common and half preferred. The officers include John C. Neale, president and general manager; R. E. Bebb, first vice president; Frederick J. Griffiths, second vice president and general superintendent and Charles E. Stuart, secretary-treasurer.

Col. Meier on German Ideals

The following sentences from a report on the meeting of the American Society of Mechanical Engineers in Germany in 1913, by the late Col. E. D. Meier, are interesting as expressing an American engineer's impression of German "Kultur."

"We are all deeply impressed," said Col. Meier, "by these facts concerning our German hosts: That they believe laws are made to be obeyed, and though they are not blessed with such myriads of laws as we, those they have they respect; that the discipline learned in school and away has built up an industrial prowess capable of even greater conquests than those at the present; that the buildlers of the great empire desire peace to enable them to continue the beneficent battle compelling all natural force to the service of man; that nowhere has the engineer won a higher social standing than as accorded him in Germany; and that his ethical sense and ideals are the same in all countries and on fully as high a level as those of the older professions."

White lead, red lead, and graphite, are good lubricants for the tail center. On heavy work make the countersinks for the centers as large as possible without making the job unsightly.

Rust-Resisting Sheet Metal Products

An exceedingly handsome and well illustrated booklet devoted to rust-resisting sheet metal products has been issued by the Newport Rolling Mill Co., Newport, Ky. The catalog deals essentially with the properties of the company's product, namely open-hearth iron, which is used in sheet metal for roofing, siding, eaves trough, conductor pipe, roof gutter, cornices, skylights, ventilators, tanks, stacks, metal window frames, metal doors, corrugated culverts, awning and arches, ridge roll, flashings and for all exposed sheet metal work. Numerous views of installations are shown and a striking chart printed in colors giving the results of comparative corrosion tests of open-hearth iron, charcoal iron, open-hearth steel, bessemer steel and reworked muck bar or puddled iron is included.

Safety Devices

An interesting paper on the development of safety devices in connection with grinding and polishing machinery was read by Chas. G. Smith, of the Pittsburgh Emery Wheel Co., Pittsburgh, at the second annual Industrial Welfare and Efficiency Congress of the department of labor and industry of the state of Pennsylvania, held at Harrisburg recently. Mr. Smith's paper covers the development of safety devices in connection with grinding wheels from a historical standpoint and also shows how the safeguards used on modern wheels have increased the efficiency of both the machines and the employes.

The Bureau of Mines, Department of Interior, has issued an interesting 16-page circular describing the prevention of accidents from explosives in metal mines. It is written by Edwin Higgins and a considerable proportion of the data were obtained in the Lake Superior iron mining region.

It is obvious that the industrial plant which would seriously take up the problem of accident prevention must undertake (first) to provide and maintain proper working conditions and efficient safeguards, and (second) to educate its employes in habits of caution.

Safety committees composed of the men, not the superintendents or foremen, but the men, are the best inspectors. They will find the danger points and suggest remedies, and then they will make the suggestions go because they are their own ideas.

A Crane Sand Cutting Machine

Description of a Device for Tempering and Cutting Over Sand in Steel and Heavy Gray Iron Foundries

GREAT steps forward have been made in the past few years in the adoption of mechanical devices for tempering and cutting sand in all classes of foundries. In steel foundries, however, as well as in certain malleable and heavy machine and jobbing foundries, somewhat less progress has been made because until recently no machine was available for the particular class of work which these foundries handle. In foundries of this type it is not customary to cut over the sand in long windrows but in heaps of various sizes distributed about the floor. These conditions do not lend themselves to the employment of what is known as the auto, or floor propelled type of sand mixing machines. Recently, however, the Sand Mixing Machine Co., New York, has developed a new machine which may be suspended from a traveling crane and thus "spotted" at any point on the floor where there is a heap of sand to be cut. The characteristics of this machine are shown in Figs. 1 and 2.

The crane machine is similar to the standard type built by the Sand Mixing Machine Co., except that it is provided with small wheels and is shifted entirely by the crane. It is suspended from the crane hook by four heavy chains secured to eye bolts in the four corners of the machine. Two of the chains are provided with turnbuckles for purposes of adjustment.

The frame of the machine is steel and the cutting cylinder is housed with steel plates. The blades in the cutting cylinder are so shaped that each one cuts off a small quantity of sand and throws it high in the air behind the machine, breaking all the lumps and separating the grains. It is said that each grain is thoroughly aerated. The sand is cooled rapidly and the steam and gas has every facility to escape. The heap, also, is left loose and light from top to bottom. The cutting cylinder revolves in Hyatt roller bearings which are dust proofed with a leather washer and three hard grease rings. It is said that the bearings need to be lubricated but once a year. On the crane type machine, the take-up reel for the electric cable is unnecessary, the current being led to the machine through a loose cable suspended from the crane.

Owing to the mobility of this type of machine, it can be used under conditions where the floor type would not be practical. This applies particularly to steel foundries where the sand is cut over in heaps, some of which may be 12 or 14 feet high. Foundries of this type usually are not provided with aisles in which the sand may be cut over. With the crane, however, the machine may be placed anywhere the sand heaps happen to lie. The size of the heap is said to be immaterial. The only condition necessary is bridge crane service above the sand and an intelligent craneman. It is stated that the burned sand which goes back into the heap is thoroughly distributed and that therefore a maximum quantity of this material may be used without harm, thus decreasing the consumption of new sand.

This type of machine also has been designed particularly for stationary machine molding where the sand must be cut and piled back of the machine after it is shaken out and wet down. The machine is designed to pile the sand wherever it is wanted. This is illustrated by Figs. 3 and 4. Fig. 3 shows the sand heap ready to be cut but before the machine has gone

FIG. 1—CRANE TYPE SAND CUTTING MACHINE AT WORK

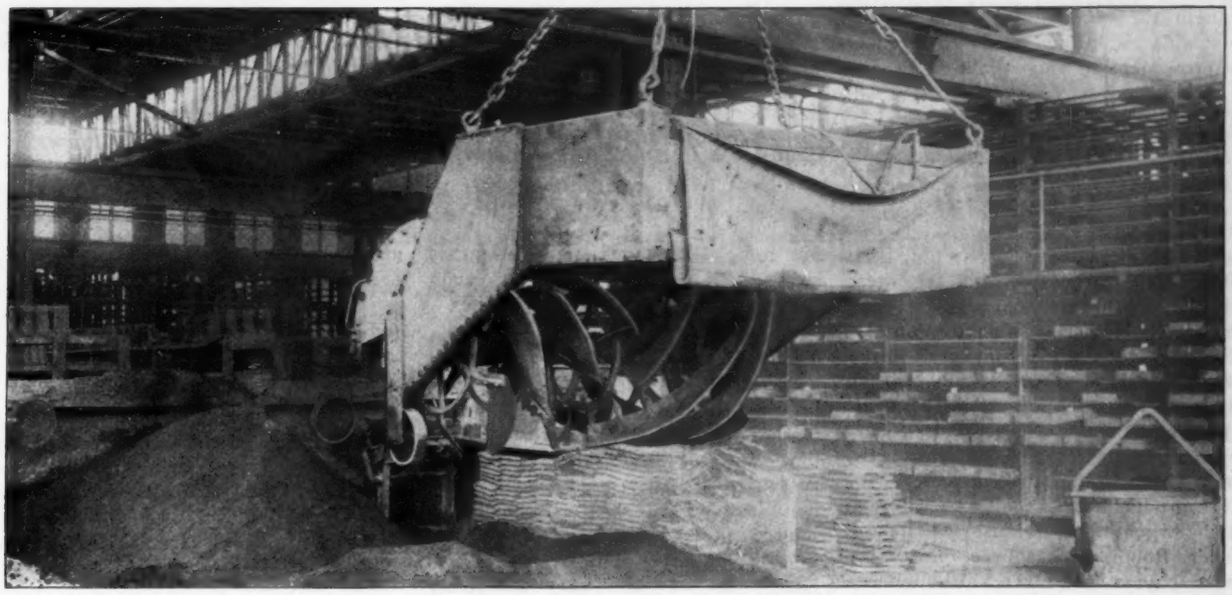


FIG. 2—MACHINE BEING SHIFTED BY CRANE

through it. Fig. 4 shows the same heap after it has been cut and piled by the machine.

The best modern steel foundries find it a paying proposition to give particular attention to the condition of their sand and in many shops a large gang of men is employed every night to thoroughly prepare the sand for the next day's work. In shops where more than one heat is poured a day, a day gang of sand cutters is also necessary. The time apparently has gone by when the steel foundryman thought it unnecessary to give his sand any particular attention. As a matter of fact, unless the heap sand is in a thoroughly renovated and properly tempered condition, trouble will be experienced regardless of the type of facings which may be used.

Furthermore, the great difficulty in getting laborers to cut sand properly is well known. It should be remembered, however, that the laborer has nothing more to encourage him than a small daily wage. In this connection the following quotation from a paper on mechanical sand tempering, read by V. E. Minich before the American Foundrymen's Association, is interesting. "It is not surprising," said Mr. Minich, "that the laborer should sometimes become discouraged and spend a night over a can of beer, leaving an uncut sand heap to face the molder on his arrival on the job five minutes before the whistle. Under such circumstances, whether or not the molder cuts it himself and works that day, is likely to be determined by the urgency of little Jimmy's need for a pair of shoes, or perhaps it depends upon who 'rules the roost' at home. To avoid the loss from such occurrences, some foundrymen require their molders to cut their own sand regularly. This can only result in a waste of the molder's skill, energy and productive capacity and a direct and material reduction of profit, which could be avoided by the use of sand cutting machinery, if supported by efficient management and active supervision.

"While French, German and other foreign foundrymen seem long to have realized the value of perfectly cut sand, it is certain that the majority of our foundrymen have been somewhat slow to recognize or accept its importance. They have freely admitted that better cut sand produces better castings with smaller loss, but having made the admission, they have continued to permit the use of poorly cut sand in their foundries, apparently losing sight of its bearing on their production and profits. But encouraging signs are not wanting. Each year discovers an increasingly large number of foundrymen who have

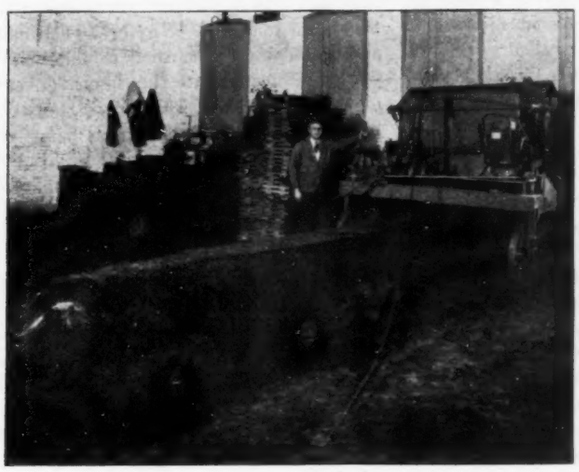


FIG. 3—SAND HEAP BEFORE CUTTING

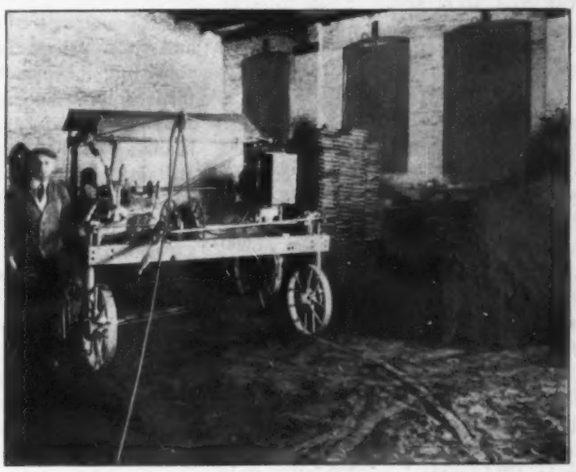


FIG. 4—THE SAME SAND AFTER IT IS CUT AND PILED BY MACHINE

caught the spirit of the times. They are wide awake and ready to test any improvement in shop practice, or any mechanical device, asking only that it shall offer fair promise of increasing production, improving quality and reducing loss, and that it shall save hand labor which is always at a premium when times are good."

The War and Our Export Trade

(*Continued from page 32.*)

large. It is interesting to note that Brazil and Argentine, by far, were the largest buyers of rails last year. Sweden, Netherlands and Austria-Hungary took good tonnages. More beams went to Great Britain than to any other destination. All the near-lying countries of Netherlands, Switzerland, Denmark, Sweden and Italy, have been important customers for that product as have also been Brazil and Argentine. Because of its oil fields, Roumania has been one of the best buyers of tubes, although its tonnage does not quite equal that taken by Great Britain. Brazil and Argentine also have been by far the largest buyers of German fabricated steel.

Germany's imports of iron and steel products in 1913 were 618,291 compared with 674,001 in 1912. These in metric tons were divided among various countries as follows:

Great Britain	194,027
Belgium	106,592
Sweden	88,084
France	55,686
Netherlands	52,188
Austria-Hungary	39,618
Miscellaneous	82,096
Total	618,291

The shipments to Germany from Great Britain included 72,820 tons of pig iron, 37,342 tons of iron and scrap, 42,061 tons of tin plate and 11,980 tons of sheets and plates. Practically all the tin plate Germany imported in 1913, came from Great Britain. Belgium's shipments to Germany largely were iron and steel scrap. Sweden delivered 44,425 tons of pig iron, 13,362 tons of iron and steel scrap, 8,826 tons of bars, 7,080 tons of semi-finished steel, and 5,296 tons of tubes.

Trade of Austria

Austria-Hungary's exports of 144,726 metric tons in 1913 were made up largely of scrap, merchant bars and heavy plates. Its shipments of scrap amounted to 25,000 tons, of bars 26,000 tons, of plates 24,000 tons and of pig iron 21,000 tons, largely of forge grade. About 5,000 tons of rails were exported. Italy, Germany and Roumania have been its largest customers. Germany's purchases last year amounted to 39,618 tons. Austria-Hungary also has bought practically all its outside iron and steel needs from Germany taking from the latter in 1913 a total of 330,560 metric tons. In this total were 110,541 tons of pig iron; 41,606 tons of semi-finished steel; 14,691 tons of bars, hoops, bands, shapes, etc., and 10,842 tons of plates.

The chief export of France is rails. These shipments in 1913 are estimated at about 50,000 tons. In 1913, France imported from Germany, 216,466 metric tons of iron and steel, of which 114,654 tons were pig iron; 14,129 tons bars, hoops, bands, shapes, etc., and 15,436 tons semi-finished steel. Great Britain shipped there 157,500 gross tons of pig iron; 21,318 gross tons of plate; 5,244 gross tons of steel bars and other material. Considerable of the material entering France, principally from Germany and Great Britain, were transshipments to nearby countries.

Russian Trade

Russia exports practically nothing in the way of iron and steel products. Its imports likewise are not heavy in proportion to its market and the government has attempted to restrict these as much as possible and to build up a home industry by the imposition of a high protective tariff. At times, however, the domestic supply is not equal to the demand and on several occasions in recent years, the government has suspended the duty temporarily to admit specified tonnages, especially in pig iron. The principal consumption of this country is in merchant products, rails and sheets and plates. Imports of rolled products and miscellaneous iron and steel products to Russia, in recent years, have been about 200,000 metric tons annually. Germany has gained most from that market, sending there in 1913 a total of 160,213 metric tons of various products and iron wares, the rolled products consisting principally of 30,691 metric tons of bars, hoops, bands, shapes, etc.; 16,756 tons of plates; 9,019 tons of beams; 7,888 tons of tubes. Great Britain in 1913 furnished Russia with 9,921 gross tons of tin plate; 16,484 gross tons of black plates for tinning; 2,923 gross tons of rails; 5,368 gross tons of steel bars and other products. Russia has been a modest buyer outside of wire products, the amount in recent years being less than 10,000 tons annually. Outside of rolled products and manufactures of iron and steel, Russia is a very large buyer of machinery. The quantity of such importations has been running about 300,000 tons annually.

Great Britain, because of its isolated geographical position and its powerful fleet, appears less likely than Germany or the other belligerent countries, to suffer any direct destruction to its iron and steel plants from hostile invasion. The main effect which the war promises to exercise upon the iron and steel industry of that country, should it be able to maintain intact its present manufacturing position, will be the necessity for the establishment of new sources of supply for the products which it largely has imported. Great Britain has been a large buyer of iron and steel products from Germany, Belgium and the United States. It has been Germany's principal customer, taking in 1913 approximately 1,200,000 tons, or about 20 per cent of the total quantity exported by that country. In addition, some of the British colonies have been buyers of German steel to a considerable extent. Germany's most important trade with Great Britain has been in semi-finished steel. The works of Great Britain never have produced sufficient rough steel to fill the needs of the mills when they were meeting a normal foreign demand for finished products. The export trade of Great Britain mainly depends upon the sale of pig iron and finished steel product. The reason why England, Scotland and Wales are such large buyers of semi-finished steel for further use in their mills, lies in the insufficient native supplies of these countries in primary materials of first grade, notably iron ore. This leads to the conclusion that they probably have been able to buy raw steel to a better advantage than they can make it. In 1913, Germany and Luxemburg furnished to the British works, according to the home government reports, 555,986 gross tons of billets, blooms, ingots, sheet bars, etc. Wire, black plates, bars and beams also have been shipped in an important tonnage.

Exports from England

Great Britain, as stated, has been an exporter primarily of finished steel products, but it also is a heavy shipper of pig iron and scrap, though last year it imported practically as much old material as it shipped out. Its foreign trade in finished products during the past decade has comprised two thirds of its total exports. Great Britain's chief rolled exports have been in rails,

sheets, tin plate and plates, bars, rods and structural shapes. Its sheet, tin plate and plate business is very large.

Great Britain is the greatest exporter of galvanized sheets and of tin plate in the world. In 1913, it shipped to other countries 762,244 gross tons of galvanized sheets and 494,921 gross tons of tin plate. In addition, it exported 71,781 gross tons of black plates for turning, 68,111 gross tons of black sheets under ⅛-inch thick and 132,989 gross tons of plates ⅛-inch thick and over.

Great Britain Largest Buyer

Great Britain, as well as being the second largest exporter of iron and steel products in the world, is the largest importer of iron and steel products in the world. The amount of rolled iron and steel material and pig iron for which it drew upon outside countries in 1913, was 2,219,902 gross tons, of which approximately 2,000,000 tons were rolled, cast or forged iron and steel, or about 50 per cent of the country's total exports of similar material. During the same period. Belgium imported 985,602 metric tons, Germany 618,281 metric tons and the United States 317,244 gross tons.

The list of imports by Great Britain of principal iron and steel products, given by classes in gross tons for the past five years, is as follows:

	1913.	1912.	1911.	1910.	1909.
Semi-finished steel	834,868	839,687	827,253	559,045	550,440
Bar iron	199,812	164,378	117,136	96,651	93,654
Steel bars	157,915	108,889	91,579	58,794	35,698
Steel shapes	109,000	116,726	78,643	81,992	60,413
Wire rods	95,196	98,449	91,928	80,567	56,796
Wire	54,390	49,097	44,069	50,706	45,350
Wire nails	50,248	55,501	47,763	43,356	44,576
Pig iron	216,708	217,472	144,330	138,460	94,884
Iron and steel plates	169,477	101,593	113,527	86,851	66,995
Hoops and strips	72,404	54,903	34,958	29,822	29,034
Tubes	52,806	34,410	24,671	20,436	16,966
Cast iron pipe	11,064	7,674	4,819	2,462	2,298
Steel castings	12,086	7,562	4,577	3,822	1,805
Steel forgings	21,506	19,432	15,000	13,691	10,275
Miscellaneous	285,227	184,179	171,086	169,755	117,242
Grand total	2,342,709	2,059,952	1,812,339	1,436,410	1,226,426

The countries from which these imports chiefly have been drawn in the order of their importance are: Germany, Belgium, United States and Sweden. About one half of the tonnage of all products received by Great Britain in 1912 came from Germany. Of the semi-finished steel taken, Germany furnished 555,986 gross tons; consisting of 312,790 tons of billets, slabs, blooms, etc., 243,196 tons of sheet bars. Belgium supplied 140,000 tons of the total semi-finished steel imported and the United States 64,999 tons.

Of all countries, Belgium has been the largest exporter of iron and steel products in proportion to its output. In recent years, it has been shipping abroad about 80 per cent of the production of its mills. With an estimated steel output of about 2,500,000 metric tons in 1913, the export shipments were 1,746,821 metric tons of which 82 per cent was in finished or semi-finished rolled products. In 1912, with a total steel ingot and castings yield of 2,515,040 metric tons, the exports were 1,698,340 metric tons. The principal product which Belgium has offered in the markets of the world has been merchant bars and shapes. In 1913 it shipped to outside countries, 649,412 metric tons and in 1912, 632,072 metric tons of such material. Since 1906, its exports of merchant material have averaged better than a half million tons annually. Great Britain took from Belgium in 1913, 140,000 metric tons of semi-finished steel, about 51,000 metric tons of plates and sheets, about 100,000 metric tons of wrought iron bars and 36,000 metric tons of steel girders. Belgium's export rail business in 1912 amounted to 164,584 metric tons. Of this total, Brazil took 22,629 tons; Holland 33,254 tons; Norway 12,873 tons; Spain 8,604 tons and Great Britain 6,148 tons. Of the beams, exported, Argentine took 21,721 tons; and of the girders, Great Britain about 36,000 tons.

Belgium also is a very large importer of iron and steel. The quantities received by it from other countries in recent years were 985,602 metric tons in 1913; 1,157,432 metric tons in 1912; 1,051,646 metric tons in 1911 and 1,046,144 metric tons in 1910. These figures of imports are somewhat misleading, in that a considerable portion of the tonnage shown was not for consumption in Belgium but was for trans-shipment to other countries, principally to Great Britain and Germany. Such supplies went through Belgium because of its excellent seaports, notably Antwerp, and consisted chiefly of scrap, semi-finished steel and wire products. Of the iron and steel products imported for its own consumption, Belgium has turned largely to Germany and next to Great Britain it has been the former's best customer. Its largest needs supplied by the German furnaces and mills, have been in pig iron and this product in 1913 represented practically one-half of the total imports. Belgium also has been an important recipient of German wire products and of German hoops, bands, shapes, etc. In 1913, it received from Germany 647,512 metric tons of iron and steel including 315,446 tons of pig iron; 70,780 tons of semi-finished steel; 45,350 tons of bars, hoops, bands, shapes, etc.; 27,091 tons of plates; 62,894 tons of wire products; 8,563 tons of rails, 9,543 tons of beams; 17,629 tons of tubes; and 4,562 tons of fabricated steel and other products. From Great Britain, the imports last year were 89,243 gross tons of pig iron; 13,363 gross tons of tin plate; 2,618 tons of black plates for tinning and other supplies.

The Rail Trade

In 1913, the race for world's leadership in the foreign trade in rails was a close one between the United States, Great Britain and Germany. Out of a world's total export trade in rails, estimated at about 1,689,000 gross tons, Great Britain furnished 500,000 tons of 30 per cent, the United States 460,000 tons or 27.6 per cent, Germany 497,000 or 29.4 per cent and Belgium 162,000 or approximately 10 per cent. A perusal of the accompanying chart giving the distribution of the total exports of rails, shows that Germany first passed Great Britain in total business in 1907, lost the leadership to the latter in 1908 and 1909 and recovered it in 1910 only to lose it again last year. The United States never has occupied a better position than second though its tonnage has grown at a much greater rate since 1910 than that of Germany. During the same period, Great Britain has gained slightly.

In analyzing the destination of rail exports in recent years, it is found that Germany's best market has been in the Netherlands, Switzerland, China and Japan, Sweden, Roumania and the British East Indies. Great Britain's best showing is in Australia and New Zealand, in India and South Africa and in Argentine and Chile. The United States has sold chiefly to South American countries to Canada and to the Far East. Belgian rails have gone largely to South America and to the Netherlands.

South American Market

South America offers the largest market for rails in the world. In 1913, not less than 300,000 tons, or about 20 per cent of the world's foreign trade, were shipped to that continent by Germany, Great Britain, Belgium and the United States. Of this total, the United States furnished 115,000 tons or considerably less than half. Argentine, Chile and Brazil have been the principal buyers of rails in South America the tonnage being heaviest in the case of Brazil and Argentine.

The distribution of rail exports of Germany, Great Britain, Belgium and the United States in 1913, so far as they can be compared from official statistics,

is given below, the totals of Germany and Belgium being given in metric tons and of the United States and Great Britain in gross tons:

	Germany.	Great Britain.	Belgium.	United States.
South America (Argentine, Brazil and Chile)	95,768	56,186	33,629	115,921
British East Indies	14,211	116,410	.....	.....
Australia	.....	135,190	.....	.....
Netherlands	34,194	.....	33,254	.....
British South Africa	.....	66,573	.....	.....
Switzerland	27,884	.....	.....	.....
China and Japan	26,812	.....	.....	20,820
New Zealand	.....	28,176	.....	.....
Portugese East Africa	.....	19,619	.....	.....
Straits Settlement	.....	19,865	.....	.....
Sweden	49,928	.....	.....	.....
Norway	4,057	.....	13,873	.....
Canada	.....	422	.....	161,971
Central America	.....	.....	.....	12,418
Mexico	.....	.....	.....	13,907
Asia and Oceania	.....	.....	.....	90,405
Miscellaneous	247,981	58,173	83,828	32,954
Total	500,835	500,614	164,584	460,553

In 1913, foreign buying of pig iron and ferro-alloys throughout the world amounted to about 2,700,000 metric tons. This was supplied among the various producing countries and in the amounts given by their own statistics as follows: Great Britain, 1,142,812 metric tons; Germany, 856,431 gross tons; United States 277,648 gross tons; Sweden, 207,000 tons; Austria-Hungary, 21,000 tons; Belgium, 16,760 tons; Spain, 50,000 tons; and miscellaneous, 100,000 tons. Great Britain, the largest seller, has widely distributed its product. It outsold Germany, its closest rival, in every market where the irons of the two countries competed except Belgium and Austria-Hungary; in fact, it furnished Germany itself with practically 130,000 tons. Great Britain sales to Austria-Hungary were negligible. Sweden exports almost 30 per cent of its make. The exports of the United States went chiefly to Canada, which in 1913 took 193,396 gross tons.

A comparison of the pig iron exports of Germany, Great Britain and the United States, with the distribution by countries, is given in the following table. The comparison is not absolute, for the reason that metric tons are used in the German shipments whereas the gross ton is the unit of weight for Great Britain and the United States:

	Germany.	Great Britain.	United States.
Belgium	315,446	89,243	4,715
Austria-Hungary	110,541	.....	4,601
France	114,654	157,500	752
Italy	65,607	109,567	24,551
Germany	.....	129,942	1,723
Great Britain	53,257	.....	21,314
United States	4,240	124,767	.....
Sweden	7,876	94,991	.....
Netherlands	51,537	69,662	1,516
China and Japan	65,607	97,158	2,293
Australia	.....	36,257	14,354
Canada	.....	35,689	193,396
Total	856,431	945,804	277,648

Iron and steel makers of the United States have little to gain in North America as they practically control the export trade of that territory. The chief trade hold of Germany and Great Britain in the western hemisphere has been in South America. In Canada, Mexico, Cuba, Central America and the West Indies, the United States practically has had things its own way. Canada has been the best customer of the United States and its purchases from this country in 1913 aggregated well over 1,000,000 tons. Practically two thirds of the exports of the United States last year were with North American countries. Great Britain did considerable business with Canada in 1913 of which 35,689 gross tons were pig iron, 32,193 tons galvanized sheets, 29,750 tons steel bars, 9,950 tons tin plate and 8,824 tons wrought iron bars. It also enjoyed some trade in galvanized sheets with Mexico, Central America and Cuba.

South America offers more than a million ton market in iron and steel products. The tonnage that continent took in 1913 approximated that figure. Argentine by far is the principal buyer, followed by Brazil and Chile. Germany, by a wide margin, has controlled most of the iron and steel business in South America. Its exports to that continent in 1913 were not less than 500,000 tons, compared with about 250,000 from the United States and about 200,000 from Great Britain and 60,000 tons from Belgium. Germany not only furnished almost 100,000 tons of rails but 112,000 tons of steel bars, hoops, and bands, 16,000 tons of plates, 78,000 tons of wire products, 46,000 tons of beams, 26,000 tons of tubes and 32,000 tons of fabricated material. England sold to Argentine 6,900 tons of wrought iron, to Brazil 5,600 tons and to Chile, 1,600 tons; of her rails, 54,500 tons went to Argentine and 1,500 tons to Chile; of other railroad supplies, 9,000 tons to Argentine; of tin plate, 19,000 tons to Argentine; of galvanized sheets, 15,600 tons to Chile, 9,700 tons to Uruguay, and 75,000 tons to Argentine. Belgium shipped 33,000 tons of rails to Brazil and 21,000 tons of joists to Argentine. Apart from rails, the export trade of the United States with South America, has been principally in sheets and plates, beams, tubes and wire products. In 1913, it consisted of about 35,000 gross tons of sheets and plates, 29,543 gross tons of beams; about 36,000 gross tons of wire products; about 20,000 gross tons of tubes and 2,000 net tons of tin plate. Argentine took considerably more than half of this tonnage.

The reflection of a very general development of the market in Brazil and Argentine by German iron and steel makers, can be observed in the figures of 1913 exports. Good tonnages were taken in practically all the leading rolled or riveted products. The taking of bars, hoops, bands, shapes, etc., of beams and fabricated steel, is of such proportions as to show that German steel figured largely in new construction work in these countries during the past year. Brazil and Argentine also took more rails from Germany than any other countries.

The principal exports from the leading producing countries to South America in 1913, are shown roughly in the table on page 93. This comparison is not exact because of the diversity in the weight unit, which for Germany and Belgium is metric tons; for Great Britain gross tons and for the United States largely net tons, nor is it complete because of the different methods employed by the shipping governments in classifying and reporting this trade.

The Obstacles

What are the obstacles to a wholesale extension of the export trade of American iron and steel makers?

It is apparent that under present economic and legislative conditions in this country, the problems that underlie the attainment of a position similar to that which has been occupied by Germany and Great Britain, signifying an increase from 100 to 150 per cent of the present volume—are both large and difficult of solution.

One of the most important points in connection with this subject bears upon the question of advisability. Is it worth while from the viewpoint of net earnings and purely business sense to divert attention from a 30,000,000 ton home market of splendid possi-

bilities, to capture at best only a portion of a world's market estimated to amount to not over 8,000,000 tons in non-producing countries where the competition is much more uncertain and severe? The answer in the past to this question by the great mass of American steel manufacturers, has been "no." The Steel Corporation, because of its immense capacity, necessitating the development of not only a large home but a broad foreign market to balance off and equalize its operations against the violent business fluctuations to which this country has been subject, is the one outstanding exception to this common decision of domestic producers. The Steel Corporation today is exporting 80 to 90 per cent of the tonnage shipped outside the United States.

In other words, American steel manufacturers have been blessed by the largest and richest market for their goods at, or to be exact, literally—within their own doors. Their position towards their home market has been radically different in this respect from that of the makers of Germany, of Great Britain and of Belgium. It has been the export trade of these countries largely that has raised them in the scale of importance in the world's production of iron and steel; conversely, it has been the wonderful home market of the United States that has made this nation far outstrip all others in the bulk manufacture of iron and steel. Germany consumes only about 55 per cent of its output of pig iron and rolled iron and steel; England about 60 per cent; Belgium only 20 per cent; while the United States is the user of 85 to 90 per cent of its own make.

It perhaps may be contended that the development of the home market for iron and steel in the United States now has reached a stage of slowest progress; that in the years to come the yearly increase in demand will be smaller and smaller because of the more thorough exploitation and development of the nation's natural resources, public works, etc., and that the manufacturers must reach out into the markets of the world if they desire to continue to increase materially their works' capacity. What soundness may be to this theory only future years can attest, but there has been nothing in the recent course of the industry to show that with a fair degree of settled business conditions in the iron and steel trade which has been denied except for comparatively brief periods since 1907, mainly because of the uncertain status of the railroads, a substantial increase in domestic demand will not appear. Between the years 1907 and 1913, there was a gain of 8,000,000 tons or approximately 33 per cent in the ingot output of the country.

"Trade follows the freight rate," said President Farrell of the Steel Corporation in a recent address in discussing export business. "Trade follows production cost," adds another prominent steel maker. Both statements tend to illustrate two of the great essentials for a large export trade. Favorable freight charges and low manufacturing costs, the latter especially in regard to the labor item, have been important factors in the upbuilding of the great foreign commerce of Germany, Great Britain and Belgium. There have been other factors, notably in the case of Germany and Great Britain, a banking auxiliary that has extended to all parts of the world and has proved a formidable aid and a strong government support. Our iron and steel manufacturers have had none of these supports. What they have accomplished has been in spite of these handicaps to themselves and of advantage to their competitors. The freight question demonstrates the indispensable value and necessity in foreign trade of a merchant marine so efficient and unrestricted by the labor and operating regulations which have stifled its growth in this country in the past that it can compete with the business navies of other countries for at least the carriage of our own products. Manufacturing costs raise the question of how much importance in world's competition should be ascribed to the difference in the labor item per ton of steel between the works of Germany, Great Britain and Belgium and of the United States. There are some leading steel men in this country who express the belief the United States cannot hope to compete with large success in the markets throughout the world until a merchant marine operating with suitable labor conditions is created and a reduction in the labor item in steel manufacture is made to bring it more in line with that of our leading competitors. Just how much of a movement in the latter direction is practicable or desirable in view of the advanced cost of living in this country, raises a very large question. That the United States in its steel making never can hope to reduce its labor charges to anything like those prevailing among its competitors, is patent. In Germany, the rate of day labor in the mills is said to be 95 cents per diem; in Great Britain about $1.20; in Belgium it is extraordinarily low, being but one-fourth to one-sixth as much as in this country. Considerable of the labor in the Belgium iron and steel industry has been performed by girls and older women, notably in the manufacture of coke and pig iron. Much of the discrepancy in labor cost between Belgium and the United States and in a less degree between Germany and the United States, Great Britain and the United States is compensated for by the superior raw materials, plant facilities, etc., which this country possesses.

The banking problem offers another important aspect of the export subject. Vice President Archibald Johnston of the Bethlehem Steel Co. in an interview with THE IRON TRADE REVIEW two years ago clearly pointed out the great help rendered to German and British manufacturers in South America by their system of foreign branch banks.

"When an American ships his material to South America his invoice or bill of lading goes to German or English banks for exchange," said Mr. Johnston. "The finances of the American manufacturer therefore are handled by the very firms with which he has to compete. There is no country, so far as my observation based upon many years' travel, goes, that is so well equipped commercially to handle foreign business as Germany. This is due to the conditions which I have outlined and is due to the enterprise of the Germans and to the very superior commercial conditions under which they work. These banks receive copies of the bills of lading which describe the goods and by reason of their handling the finances know the price at which you sell the customer. This information gives the Germans an inside line on any business transaction by Americans. I lay stress particularly upon Germany as our rival in the export trade due to the fact that information obtained through these channels is circulated more particularly by the German government than by any other. While the English have access to the same

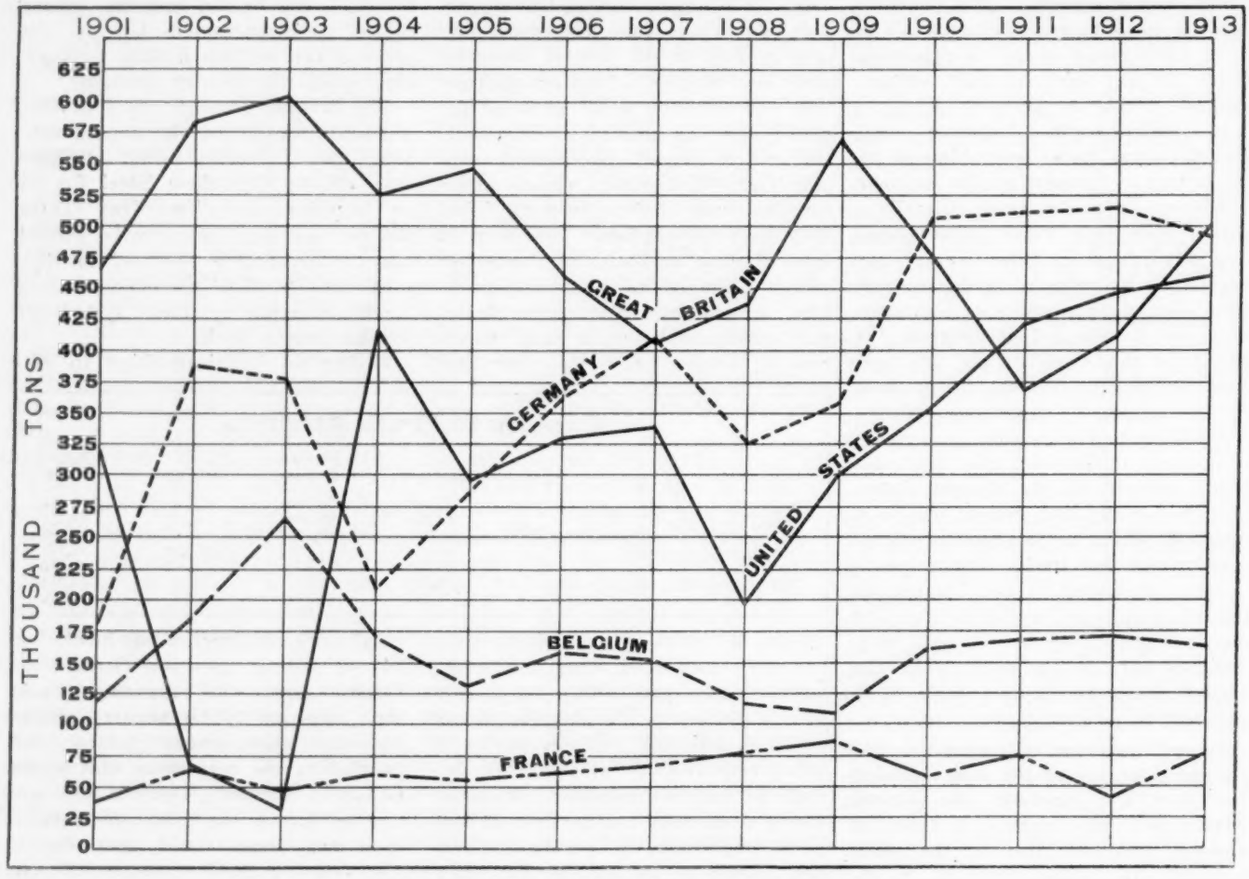
Exports to South America

	Germany.	Great Britain.	Belgium.	United States.
Rails	95,768	56,186	33,629	115,921
Sheets and plates	16,715	98,508	.....	35,324
Tin plate	.....	19,330	.....	2,227
Beams and structural	45,496	.....	21,721	29,543
Tubes	26,488	.....	.....	21,316
Wire products	78,334	.....	.....	36,916
Merchant bars, etc.	112,228	28,289	.....	.....

information, it is not so successfully transmitted to their manufacturers as it is by the Germans and to this condition, I attribute the rising and splendid set of commercial conditions under which the Germans work and as the result of which they have become so important a factor in supplying material to the South American republics."

"The objectionable triangle" is the phrase applied to our past necessity for clearing through foreign banking centers, particularly London, the settlement of business done with South American countries. A merchant in Buenos Aires buying goods in this country arranged his exchange with London and not direct with this country because he does his banking chiefly with London and his credits are there. Since he has received his financial accommodations there he has been a large seller, as well as a large buyer through London. When buyers in the United States purchased beef or hides or coffee or whatnot, from South America, they also have been obliged to settle their balances through London because that city has been the international clearing house of the world. The delivery of sales to South America or purchases from South America by the United States, has been by way of London. In this way, London, at all times, has received its toll on the United States' South American commerce in exchange, fees, freights to British ships, brokerage, etc.

The opportunity for the abolishment of this system of round-about banking and dealing has been offered to the business men of the United States by the new currency system now in effect, which grants authority to national banks to accept bills of exchange and thereby encourage them to establish foreign branches. An entering wedge already has been driven against the old methods by the establishment in leading South American cities of branches of the National City Bank of New York City.



RAIL EXPORTS OF FIVE LEADING COUNTRIES

Book Review

"The Cementation of Iron and Steel," by Dr. Federico Giolitti, translated from the Italian by Joseph W. Richards and Chas. A. Rouiller; 407 pages, cloth, 6 x 9 inches; published by the McGraw-Hill Book Co., and furnished by THE IRON TRADE REVIEW for $4.00 net.

The chief practical value of this book lies in its clear scientific explanation of the processes of case hardening, although the entire field of cementation is covered thoroughly both from theoretical and practical metallurgical standpoints. The author is an Italian scientist of considerable prominence and his work appeared first in the Italian language in 1912. The following quotation from the translators' preface indicates the scope of the book: "While regretting the author's commercial connection prevents him telling all he knows on several important questions, such as the carburization of armor plate, yet he has nevertheless made the industrial and scientific world his debtors by the vast amount of detailed information he has given with regard to the scientific investigation and control of cementation processes." Excluding a historical introduction, the book is divided into two parts. The first part covers the chemistry of the cementation processes; the second part deals with industrial applications of cementation, including the manufacture of steel by this method, case hardening, heat treating methods of controlling the process and data regarding patents covering cementation. Although the book is quite readable, it can only be recommended to those who are well grounded in metallurgy.

Dry bicarbonate of soda applied to a burn will draw out the heat; molasses and flour will also do this.

An Extraordinary Year in Ferro

Prices Advanced Rapidly Following Declaration of War—Complications Connected With Foreign Trade—Effect of Appearance of United States Steel Corporation as a Seller

SO MANY extraordinary and unusual events have not occurred in many years to affect the course of the ferro-manganese market as in the single year of 1914. From an open market period in the initial month of the year, when prices struck the lowest level since 1905, or $35, seaboard, the range of quotations in August, under the influence of war conditions, swung to a point where small sales actually were made at $140, seaboard. This represented the highest price reached by ferro-manganese since following the Russian-Japanese war in 1906.

The market for standard English ferro-manganese opened in the year at around $45, seaboard. A break in the syndicate arrangements of English makers occurred during the latter part of January, due, it is understood, to the appearance in England of a new independent seller in the field and probably also in part to the fact that the Steel Corporation had come out as a seller at the close of 1913 and was credited with selling at below the schedule of foreign producers. Prices quietly were slashed and a vigorous selling campaign in the country was conducted by all foreign producers for a few days. Between Jan. 25 and Feb. 1, it is estimated that fully 75,000 tons were sold, covering the needs of buyers for practically the balance of the year, and as events proved for a larger period, because of the decline in consumption. These sales were made at $35 to $37, seaboard, and most of the tonnage was placed at $36 and $37. By Feb. 3, the movement having subsided, the market resumed a more normal condition and prices steadied at $38. Barring the selling of some German material at $37, the market continued well around that figure until July 30, when the outbreak of the war caused all quotations to be withdrawn.

Ferro-Manganese Exports to United States.

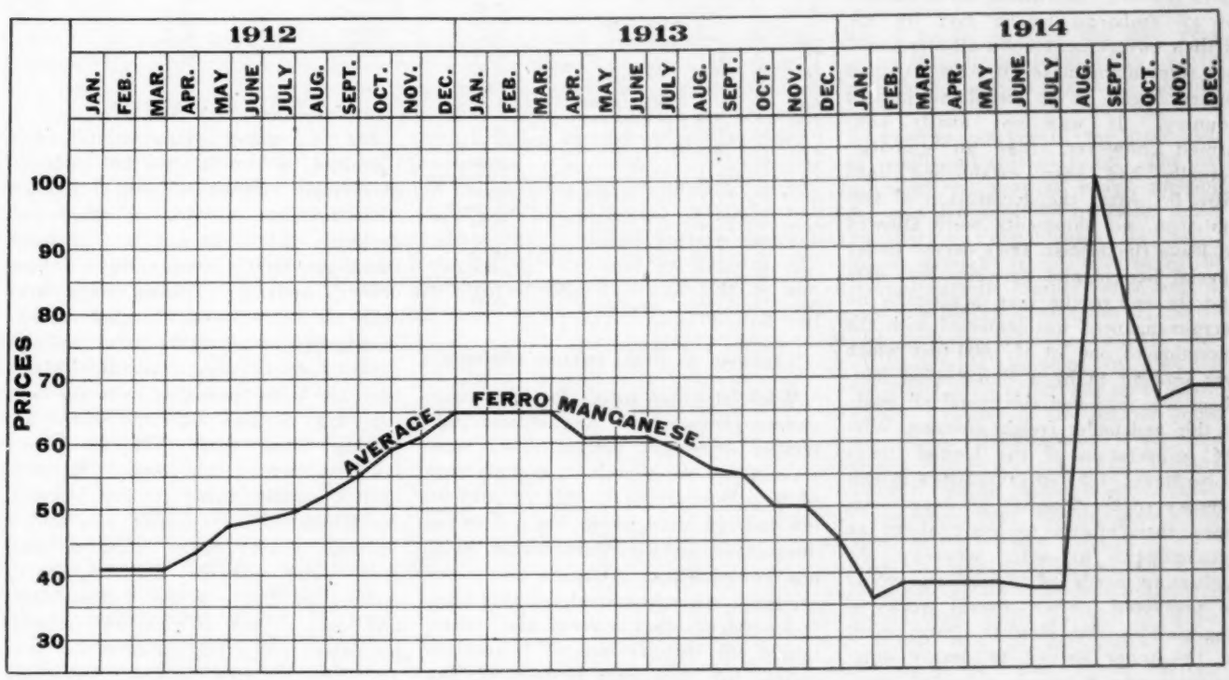
1914	* 80,000
1913	128,070
1912	99,137
1911	80,263
1910	114,278
1909	88,934
1908	44,624
1907	87,400
1906	84,359
1905	52,841

*Estimated.

Then ensued a brief period of great uncertainty and there was a meteoric rise of prices for spot material. Under a temporarily panicky condition of the market, some sales actually were made at $140, seaboard, and higher figures were quoted. For a time, there was doubt what would be the fate of unshipped portions of contracts for the remainder of the year and running into the first quarter and first half of 1915.

The uncertainty over supplies of ferro-manganese caused many consumers to adjust their practice to use spiegeleisen instead and large tonnages of the latter alloy were sold by the principal domestic producer. Practically the entire output of the latter for shipment up to July 1, 1915, was contracted for. Prices of domestic spiegeleisen advanced about $5 a ton to $30, furnace, for 19 to 21 per cent and to $28 for 17 to 19 per cent material. Order was restored to the ferro-manganese market, when several English producers announced on Aug. 15 that shipments would be resumed upon the agreement of buyers to assume $2.50 per ton extra to cover war risks, increased insurance, etc., and that some additional tonnage would be accepted for early delivery at $100, seaboard.

With the market at $100, seaboard, the Steel Corporation again showed activity as a seller and booked some tonnage from other steel companies. Certain of these sales it was announced were made at around $85, seaboard. The news that the Steel Corporation was selling and of the minimum prices



PRICES OF FERRO-MANGANESE, 1912-1914

it had quoted quickly was followed Sept. 12 by a reduction by English makers in their schedule to $80, seaboard. Little then was heard of the Steel Corporation as a seller. Resale ferro-manganese in the hands of merchants began to appear on the market after the establishment of the $80 price and some transactions of this class were made at $75, seaboard. On Oct. 2 another formal reduction to $68, seaboard, was put into effect by English makers, which, in turn, was followed by a further softness of the market on resale material, sales at $67.50 and down to $65 being closed. All these respective changes in the market from $100 down were accompanied by a light volume of sales, as consumers found themselves well covered, especially at the reduced rate of operations and under no anxiety, with the resumption of shipments upon unfilled contracts.

At this stage of the market, inquiries were circulated in this country for ferro-manganese for export to Sweden, Italy, Australia and to other points. English makers, fearing that some of this metal inquired for finally would go to enemies of that country, declined to bid for the business and requested their agents in the country not to do so either. Merchants however, took on some of this re-export business and sold from stock to Sweden, while an eastern Pennsylvania steel maker furnished from supplies on hand a small lot for Australia. These re-export sales were closed at $66 to $68, seaboard.

When the reports of the re-export sales reached the British Isles, rumors of an embargo to be laid by the British government upon all shipments of ferro-manganese to the United States began to be circulated in this country. It was not finally confirmed, however, that an embargo actually had been established until Nov. 8. After the declaration of this embargo, no shipments were allowed to leave the British Isles except under special license and between that date and the end of the year, practically no ferro-manganese was imported with the exception of one lot of 1,600 tons which was brought in by a Philadelphia merchant who had had this metal all ready to ship and under freight contract. With the co-operation of the United States government, the representatives in this country of the English producers, exerted their efforts to bring about an arrangement to ship, whereby the legitimate needs of consumers would be protected. After several weeks of negotiation, the English government in December agreed to permit shipments to be resumed, provided guarantees were given that none of the alloy would be re-exported to Germany, Austria, Turkey or to contiguous countries and that none of the steel into the making of which the English material entered, would be exported to the enemies of Great Britain and her allies. Under these conditions, it was expected that the interruption of deliveries would be terminated in January. During the period of the embargo, sellers continued to quote subject to their ability to ship and took a number of such provisional orders. The market at this time was very firm at $68, seaboard, and remained so at the close of the year.

Imports of Manganese Ore to the United States.

1913	345,090
1912	300,661
1911	176,852
1910	242,348
1909	212,765
1908	178,203
1907	209,021
1906	221,260
1905	257,033
1904	108,519
1903	146,056

The dates upon which official or unofficial changes in ferro-manganese prices at eastern seaboard occurred during the past three years, are as follows:

Jan. 1912 (market)	$ 41.00
Apr. 15, 1912	43.50
Apr. 27, 1912	46.00
May 10, 1912	48.50
July 24, 1912	51.00
Aug. 23, 1912	53.50
Sep. 9, 1912	56.00
Oct. 7, 1912	61.00
Nov. 29, 1912	65.00
Apr. 1, 1913	61.00
July 8, 1913	58.50
Aug. 8, 1913	56.00
Sep. 26, 1913 (with duty)	52.50
Oct. 3, 1913 (duty free)	50.00
Dec. 2, 1913	47.00
Jan. 6, 1914	45.00
Jan. 25, 1914	40.00
Jan. 27, 1914 (open market)	35.00-37.00
Jan. 29, 1914 (open market)	36.00-37.00
Feb. 3, 1914	38.00
Feb. 5, 1914	38.00-39.00
May 12, 1914	38.00
June 30, 1914	Prices withdrawn
Aug. 19, 1914	100.00
Sept. 9, 1914	85.00-100.00
Sept. 12, 1914	80.00
Sept. 21, 1914	75.00-80.00
Oct. 2, 1914	68.00
Oct. 26, 1914	65.00-68.00
Nov. 8, 1914	Embargo declared
Nov. 8, 1914	68.00
Dec. 8-11, 1914	*

*Conditions for lifting embargo stipulated.

While the high prices for ferro-manganese prevailed, in August and September various propositions were framed for the merchant manufacture of ferro-manganese in this country to use foreign manganese ore. Furnace interests in eastern Pennsylvania, western Pennsylvania, Alabama and other sections seriously considered this plan. Independent steel makers also entertained the manufacture of ferro-manganese for their own protection. The manganese ore market at this stage showed considerable life. The Carnegie Steel Co. announced its schedule of prices for domestic manganese ore at 26 cents Pittsburgh, for 49 per cent ore, with the usual differentials for the lower grades. Several cargoes of Russian ore which were afloat, were diverted to this country and sold to independent steel companies, including the Pennsylvania Steel Co., the Cambria Steel Co., and others at prices of about 26 cents per unit of manganese at tidewater. The Steel Corporation also was the purchaser of round lots of Brazilian ore and some sales of this mineral to other steel makers were closed. The shutting off of manganese ore shipments to this country from Russia and India by embargo or war conditions has caused interest to be centered in Brazilian ore and the imports from that country to the United States promise to be sharply increased.

Sales of German ferro-manganese to the United States in 1914 probably were the heaviest in history, but the war nullified such tonnage as had not been delivered up to that time. On several occasions during the first half, German ferro-manganese sold at $1 a ton under the English official figure.

Average prices for ferro-manganese at eastern seaboard based on actual sales for the past three years, have been as follows:

	1914.	1913.	1912.
January	$ 36.00	$65.00	$41.00
February	38.00	65.00	41.00
March	38.00	65.00	41.00
April	38.00	61.00	43.50
May	38.00	61.00	47.50
June	37.50	61.00	48.00
July	37.50	58.50	49.50
August	100.00	56.00	52.00
September	80.00	55.00	55.00
October	66.00	50.00	59.00
November	68.00	50.00	61.00
December	68.00	45.00	65.00

Drill Calendar

The Cleveland Twist Drill Co., Cleveland, is sending to the trade an exceedingly attractive wall calendar, which depicts primitive methods of drilling. Six drawings are included which graphically portray the following drilling methods: Eskimo using bow-drill for boring holes in sled runner; Zuni Indian jeweler using pump drill for boring hole in stone ornament; Malay islanders using primitive drill for boring hole in gun barrel; South Sea islander using shaft drill for boring holes in timber for canoe; Egyptian chariot builder using ancient bow-drill for boring hole in chariot axle and a Japanese sandal maker using a shaft drill. The calendar also contains a number of sheets giving drilling helps and hints, as well as numerous interesting tables and other valuable and useful data covering drilling operations.

A Clearing House for Manufacturers

(*Continued from page 20.*)

an impending shutdown of various plants which used the imported glass, unless an American substitute could be discovered. One of these was watch crystals. Watch factories and jewelers depended on a continuous supply. After unsuccessful experiments by bottle makers and electric globe makers, the association finally found a maker of table glassware who made satisfactory watch crystals by the same process he used in making sherbet glasses. Prices were reasonable and the glass makers were glad to get the business.

Manufacturers of automobile accessories found after the outbreak of the war that they were unable to get bent and curved glass mirrors and lamp fronts and unless a supply was discovered, would be obliged to stop making their goods. A special trip of an investigator to a glass factory in the west revealed that if a contract were offered, the company would undertake to make the curved glass goods and immediately an order was entered for several hundred thousand, with the result that added business was experienced on both ends of the transaction.

A Chicago plant, whose ordinary product was heavy machinery, found it had no outlet and was about to shut down. Application to the Association of Commerce revealed the fact that a pump of special design was seeking a manufacturer and that it could be made without change in equipment. The result was the manufacturer and the owner of the pump got into communication and a new business relation resulted which kept the plant in operation.

A metal spinning and stamping manufacturer who found demand for his products badly cut down was brought into communication with a dealer in metal toys heretofore imported from Europe and has been making toys for several months without material change in his equipment.

Questions Sent Out

In gathering its information, the Chicago Association of Commerce sent out several sets of questions to all its members and to other manufacturers in the Chicago district. Four questions are included in one of the question blanks, as follows:

1.—Have you a product that you wish to have manufactured?

2.—Have you equipment able to manufacture articles which you are not manufacturing at the present time?

3.—What articles or materials in your business have become scarce or unobtainable since the beginning of the present situation abroad?

4.—Have you discovered a new source of supply for articles or materials which prior to the present situation were supplied by European countries?

A similar set of inquiries was made with the exception that instead of asking in regard to materials manufactured outside of this country the inquiry narrowed to the city of Chicago, in an effort to aid both the producer and the consumer of Chicago-made articles.

The question was asked what materials have to be secured outside of Chicago, whether it would help if the source of these materials could be brought closer to the city and whether partially manufactured articles are sent elsewhere to be finished, followed by the inquiry whether it would be to the interest of the Chicago makers if these products could be furnished in Chicago.

The latter set of questions is simply a narrower application of the "Made in America" idea to apply to the home city instead of to the country at large.

As a result of these inquiries, both from the national and the narrower city viewpoint, a large volume of information has been gathered which is becoming increasingly valuable and as knowledge of its possession is spread more and more, use is being made of it by Chicagoans and others who can find access to it

Year of Disappointment in the East

(*Continued from page 39.*)

stacks blowing and 18 cold. On the corresponding date in 1914, the active totals were 16 each in both merchant and non-merchant furnaces. Of the furnaces in the Eastern Pig Iron Association, 18 were blowing Jan. 1, 1914, and 11 on Jan. 1, 1915.

Total stocks of iron on furnace banks, both merchant and non-merchant, in various eastern districts, were approximately 200,000 tons, Jan. 1, 1915, less than half of which was in the hands of regular sellers. One steel moker had about 65,000 tons. Merchant stocks declined in the year approximately 10 per cent. They were largest in February, but steadily declined until October, when they had fallen about 33-1/3 per cent since January. From that time on, they have been increasing moderately.

In the Virginia district, only three furnaces, one Crozer, Pulaski and Allegheny, representing about 20 per cent of capacity, were making iron at the opening of 1915. On Jan. 1, 1914, eight stacks were active. Virginia stocks increased rather heavily in the year and were about 150,000 tons at the close. On the corresponding date, the previous year, they were about 75,000 tons. Most of the present stock is being carried by two or three producers.

A comparative statement of the merchant and non-merchant furnaces in blast in the principal eastern manufacturing districts and in Virginia at the close of 1912, 1913 and 1914, is as follows:

	1914		1913		1912	
	Merchant.	Non-Merchant.	Merchant.	Non-Merchant.	Merchant.	Non-Merchant.
Lehigh Valley.	4	4	4	7	9	7
Schuylkill Val.	2	2	3	4	4	6
Lebanon dist..	2	2	4	3	5	6
Cent. Pa.....	2	0	2	0	4	0
New Jersey...	1	0	2	0	1	0
Maryland	0	1	0	2	0	3
Tidewater	1	0	1	0	1	0
Total	12	9	16	16	24	22

	1914	1913	1912
	Merchant.	Merchant.	Merchant.
Virginia	3	8	6

Two merchant furnaces in Virginia, Buena Vista and Oriskany, are scheduled to go in early in the new year. One of the Thropp furnaces in Central Pennsylvania also is about to go into blast.

The scrap market of the past year was small and soft in price. The net change of the year in heavy melting steel was from $10.50 to $9.50, delivered eastern Pennsylvania; in No. 1 railroad wrought from $13.25 to $11.50, delivered eastern Pennsylvania, and in heavy machinery cast from $12.50 to $11.50, delivered eastern Pennsylvania. A considerable tonnage of Panama canal and Cuban scrap was sold in the east, the last sale of the former being about $8.50, Philadelphia. Italy and Scotland late in the year were bidding for heavy melting steel and car wheels, offering good prices, but the high ocean freights were blocking sales.

From a structural standpoint, the year in eastern territory was extremely unsatisfactory, both to the fabricating shops and to the mills. The American Bridge Co., in its eastern division, booked about a normal tonnage, or 300,000 tons. Independent

shops took slightly less. A normal year in the eastern market represents about 1,000,000 tons.

The amount of building work in New York City was far below normal and it is estimated the tonnage was only about 50 per cent of the average annual offering of the greater city. Had it not been for the approximately 175,000 tons of subway and elevated steel placed, the situation would have been far more severe. Of the steel for this rapid transit construction, a little more than half went to the American Bridge Co. and the remainder to the independents, including Milliken Bros., Inc., the McClintic-Marshall Co., the Phoenix Bridge Co., the Lackawanna Bridge Co., the Pennsylvania Steel Co. and the Belmont Iron Works. The largest single lot placed was about 50,000 tons for third tracking of elevated lines. In addition to the riveted steel work, there were placed about 100,000 tons of cast iron segments for subway tunnels under the East river, which were divided between the Buffalo Car Wheel Co., the Wheeling Mold & Foundry Co. and the Davies & Thomas Foundry Co. The structural steel tonnage required for New England in the year has been about normal. Philadelphia also put out about the usual amount. Baltimore, however, was considerably below the average and the shrinkage throughout the southeast was marked.

Prices in fabricated and plain material have moved in accordance with the reduced volume of the market and at no time were at a point where they permitted more than slender profits, owing to the close competition. Loft and apartment house construction in New York City went down to $45 per ton, erected, and even broke through that figure in the former class. Near the close of the year, pier construction in New England brought out quotations of $43.50, erected. Beam work sold around $30, New York.

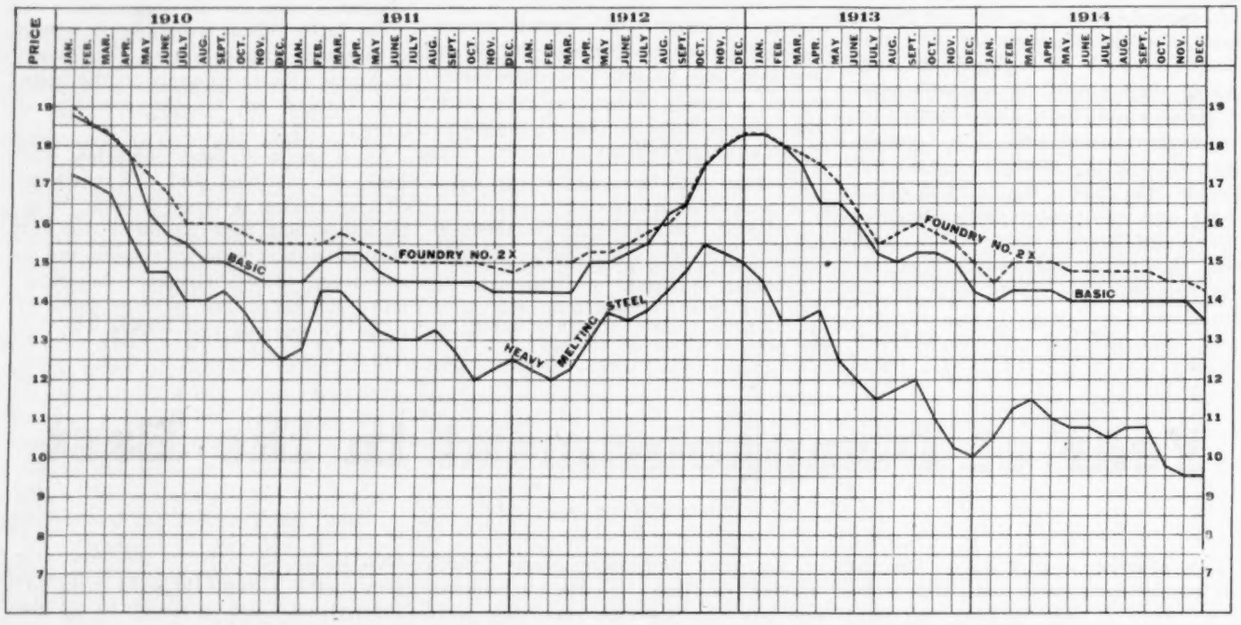
Plain shapes declined steadily through the year in the eastern market. They started the year at about 1.35c, Philadelphia, or 1.20c, Pittsburgh. In December, they were openly at 1.20c, Philadelphia, or 1.05c, Pittsburgh, and that price was being shaded by nearby mills absorbing some of their freight advantage so that the Pittsburgh equivalent was between 1c and 1.05c. Eastern Pennsylvania shape mills operated at capacity only on occasions. In the final month, some of them were running not over 25 to 33 1/3 per cent.

The plate market in the east kept pace with the poor conditions in shapes. Light locomotive and reduced ship building were felt keenly by eastern Pennsylvania mills. Prices were soft at all times. In instances during December, they broke through a 1.05c, Pittsburgh, base, equivalent when the nearby mills sought to clinch local business. These same makers quoted approximately 1c, Pittsburgh, on plates for export. The plant of the Central Iron & Steel Co., at Harrisburg, was shut down in October and still is idle as is also the mill of the Glasgow Iron Co., at Pottstown. The new plate mill of the Alan Wood Iron & Steel Co., at Ivy Rock, Pa., which went into commission, was operated spasmodically.

The structural steel lettings in the United States by months during the year of 1914, giving both the tonnage and the per cent of capacity contracted for, in accordance with the statistics of the Bridge Builders' and Structural Society and of other leading fabricators, is as follows:

Month.	Tonnage.	Per cent of capacity.
January	110,000	63
February	105,000	62
March	130,000	76
April	150,000	88
May	100,000	57
June	95,000	56½
July	115,000	68
August	50,000	27½
September	65,000	38½
October	60,000	35
November	35,000	20
December (estimated)	45,000	25
Total	1,060,000	51+*

*Average.



PRICES OF NO. 2 FOUNDRY AND BASIC PIG IRON AND HEAVY MELTING STEEL IN THE EAST

Railroad buying of direct iron and steel products or manufactures of iron and steel during the past year, was the smallest since 1908. In some products, the showing was even poorer than during the severely depressed period six years ago. The railroads had adopted and they followed persistently throughout the year, policies of strictest economy and confined their purchases to bare maintenance needs.

The car market was exceedingly small. Statistics carefully compiled by THE IRON TRADE REVIEW show the total number of passenger and freight cars ordered by the railroads from outside builders or from their own shops, to have been approximately 70,000. Of this total, all but a small fraction was ordered during the first seven months of the year.

When financial conditions were upset in August, the modest rate of equipment buying that had been going on in the preceding months, practically was stifled. The number of cars ordered in August, September, October and November, approximated only 1,650. October, when only 43 cars were ordered, is said to have been the lightest month in the history of the car building industry of the United States. In December, there was evidence that the attractively low figures on equipment, available from builders were stimulating more interest among the railroads and there was a slightly better buying and inquiry. The New York Central system was the largest buyer of cars in the year, closing for approximately 13,000 cars. The Union Pacific, Southern railway, Illinois Central and the United States Steel Corporation were fair purchasers. The Pennsylvania railroad was a very light buyer. Because of conditions in the market, car builders had a severe struggle to maintain even a small scale of plant operations. Very little capacity was active at the close of the year.

The number of cars, passenger and freight, ordered by the railroads of the United States in 1914, as compiled from very carefully verified statistics, is given by months as follows:

January	13,000
February	9,000
March	7,500
April	10,000
May	6,000
June	15,000
July	7,000
August	1,100
September	100
October	50
November	500
December	2,000*
Total for the year	70,250

*Estimated.

This total compares with about 125,000 cars placed in 1913; 235,000 in 1912; 125,000 in 1911; 140,000 in 1910; 190,000 in 1909 and 60,000 in 1908.

Orders for locomotives were remarkably small and did not exceed 1,000 in the year. This compares with an annual average of about 3,800 ordered during the preceding 13 years. In September and October, some of the leading builders received orders for only two or three locomotives. An interesting feature of the locomotive industry was the increased demand for export after the beginning of the war. Russia inquired in this country for 65 and placed 30 with the Baldwin Locomotive Works. France ordered 20 light locomotives from the same builder. Greece placed 20 with the American Locomotive Co.

Total reported rail orders booked by the mills in 1914 aggregated only about 1,250,000 tons, equivalent to probably 25 per cent of the rolling capacity of the country. Export orders, which are included in the total, approximated 100,000 tons. The distribution by months of the reported orders in 1914 was approximately as follows:

January	175,000
February	215,000
March	60,000
April	60,000
May	110,000
June	215,000
July	130,000
August	70,000
September	40,000
October	30,000
November	115,000
December	30,000
Total	1,250,000

The buying of rails in 1914 was the lightest in many years, the railroads showing in this product as in all others, that where necessity pressed, they could pare down their needs to remarkably small proportions. There is no doubt, however, that the severe retrenchment undertaken is resulting in the constant accumulation of large rail requirements which will be needed when the uniform upbuilding of road property to proper standards finally is undertaken. Rail makers are anticipating the release of a heavy tonnage when that occasion arises, which is not likely to be, however, until pending measures for increasing revenues have been put into effect. During the last quarter some of the roads awarded some tonnage against their 1915 budgets to help out the mills. These lettings totaled between 125,000 and 150,000 tons, including 67,000 tons for the Santa Fe; 30,000 tons for the New York Central; about 15,000 tons for the Delaware, Lackawanna & Western, and 10,000 to 15,000 tons for the Lehigh Valley. Some of this tonnage was rolled in December, so that makers at the opening of 1915 did not have 100,000 tons upon their books, as compared with about 400,000 a year ago and 3,000,000 tons two years ago.

Ship Building Work Fair

Ship building activity along the Atlantic coast during the past year showed a heavier tonnage of work launched or completed than during the preceding year. The vessel tonnage launched or completed by the six principal yards reached about 200,000, but this was swollen chiefly by the finishing up of three battleships. In 1913, the tonnage built was about 160,000. Most of the construction carried out in 1914 was contracted for in the preceding year. On Jan. 1, 1914, the ship yards had reported about 300,000 tons of work under contract. At the beginning of 1915, they have approximately 275,000 tons on the ways, including two new battleships and three others, for which the keels were laid before 1914. In addition, two colliers, a number of destroyers and other craft for the navy department were under way.

The tonnage of merchant vessels taken in the year was exceedingly light, as the market was poor up until the last two months, when high freights, the encouragement of American registry by national legislation and other changes in the maritime world produced by the war stimulated the interest of shipping companies and caused the revival of a number of projects for new construction, which previously had been under consideration but had been temporarily dropped because of business conditions. Early in December, contracts were placed for seven or eight merchant vessels, including three tank ships. An interesting contract which was closed at that time was for an 8,000-ton tanker placed with the Harlan & Hollingsworth Corporation by the Anglo-Saxon Petroleum Co., a British company. Indications at the year's close were that eastern ship yards were approaching a period of favorable activity, because in addition to the work placed, a number of other vessels were being figured on.

The United States Steel Corporation, in the year, lost over 800,000 tons, or approximately 20 per cent of its order book. It began the year with 4,282,108 tons and closed it with approximately 3,400,000 tons. Gains were shown during six months and losses during six. The largest gains were made during January and February. Then followed three months of sharp decline, which was succeeded by three months of relatively small gains. The depressing effects of the war were reflected in the heavy losses in September and October and by the lighter one in November. In December there was some gain. During the latter month, a balance between the incoming and outgoing tonnage more nearly was struck and the prospects were improved for more pronounced recovery of orders after Jan. 1.

The following is the statement of unfilled orders by months during 1914, showing the net changes:

Date.	Total.	Change tonnage.
Dec. 31, 1914	3,400,000*	75,000+
Nov. 30, 1914	3,324,592	136,505—
Oct. 31, 1914	3,461,097	326,570—
Sept. 30, 1914	3,787,667	425,664—
Aug. 31, 1914	4,213,331	54,742+
July 31, 1914	4,158,589	125,732+
June 30, 1914	4,032,857	34,697+
May 31, 1914	3,998,160	278,908—
Apr. 30, 1914	4,277,068	376,575—
Mar. 31, 1914	4,653,825	372,615—
Feb. 28, 1914	5,026,440	412,760+
Jan. 31, 1914	4,613,680	331,572+
Dec. 31, 1913	4,282,108	114,239—

*Estimated.

Average Monthly Prices of Iron and Steel Products, 1903-1914

Finished Products in Net Tons. Pig Iron and Billets in Gross Tons

1903

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$25.00	24.00	24.00	23.00	21.70	20.50	18.50	17.50	16.85	15.90	14.50	14.30
Gray Forge Cincinnati	$20.50	20.75	19.35	19.20	17.70	16.50	14.60	13.50	13.25	12.30	10.95	10.75
Plates Chicago	$35.00	37.00	38.00	40.00	37.75	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Billets (Bess.) Pittsburgh	$29.75	30.00	30.25	31.00	30.50	29.50	27.50	27.00	27.00	26.50	23.50	23.00
Bessemer Pig Pittsburgh	$22.35	22.35	22.00	21.60	20.00	19.85	19.00	17.85	16.35	15.85	15.25	14.35
Beams Pittsburgh	$35.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Bar Iron Cleveland	$32.00	37.00	37.00	36.00	35.00	33.75	22.00	30.00	29.00	28.00	26.00	25.50
No. 2 Foundry Birmingham												

1904

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$14.10	13.75	13.55	14.00	13.80	13.40	13.30	13.35	13.40	13.70	15.60	16.60
Gray Forge Cincinnati	$11.00	11.00	11.25	11.75	11.25	10.75	10.75	11.00	11.00	11.75	14.25	15.00
Plates Chicago	$35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	35.30	29.30	29.30	30.10
Billets (Bess.) Pittsburgh	$23.00	23.00	23.00	23.00	22.00	21.50	21.00	20.00	19.50	19.50	21.00	21.00
Bessemer Pig Pittsburgh	$13.60	13.35	13.85	14.10	13.60	12.60	12.50	12.65	12.75	13.35	15.25	16.60
Beams Pittsburgh	$32.00	32.00	32.00	32.00	32.00	32.00	32.00	32.00	28.00	28.00	28.00	80.00
Bar Iron Cleveland	$25.00	26.00	27.00	29.00	29.00	28.00	28.00	25.00	25.00	27.00	28.00	32.00
No. 2 Foundry Birmingham	$ 9 75	9.50	9.70	10.00	9.65	9.15	9 15	9.50	9.50	10 65	12.75	13.05

1905

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$17.50	17.50	17.50	17.50	17.25	16.60	16.15	16.35	16.50	17.55	18.90	19.50
Gray Forge Cincinnati	$15.25	15.20	15.00	15.20	14.81	13.35	12.28	13.00	13.00	13.88	15.35	15.75
Plates Chicago	$31.30	32.30	32.30	34.80	35.30	35.30	35.30	35.30	35.20	35.30	35.30	35.30
Billets (Bess.) Pittsburgh	$21.00	24.90	24.60	25.50	23.50	22.00	22.00	23.50	25.75	25.95	26.30	26.50
Bessemer Pig Pittsburgh	$16.85	16.45	16.35	16.30	16.20	15.65	15.00	15.40	15.90	16.50	17.70	18.10
Beams Pittsburgh	$30.00	31.00	32.00	32.00	32.00	32.00	32.00	32.00	34.00	34.00	34.00	34.00
Bar Iron Cleveland	$33.25	33.00	32.00	32.00	31.50	30.00	29.75	32.00	34.00	34.25	37.20	40.00
No. 2 Foundry Birmingham	$13.50	13 50	13 50	13.25	12.75	11.85	11 00	11 65	11.75	12.50	14.00	14.00

1906

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$19.25	19.25	19.00	18.75	18.50	18.10	18.30	18.90	19.75	21.50	26.50	27.00
Gray Forge Cincinnati	$15.75	15.05	14.85	14.75	14.75	14.65	14.55	15.40	16.50	17.50	21.70	22 00
Plates Chicago	$35.30	35.30	35.30	35.30	35.30	35 30	35.30	35.30	35.30	35.30	35.30	37.30
Billets (Bess.) Pittsburgh	$27.00	27.50	27.65	27.75	27.00	26.25	27.00	28.00	28.50	28.50	29.00	29.75
Bessemer Pig Pittsburgh	$17.32	17.29	17.24	17.25	17.24	17.38	17.57	17.96	18.44	20.06	21.96	22 75
Beams Pittsburgh	$34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Bar Iron Cleveland	$38.00	35.50	34.00	33.00	32.00	32.00	32.00	33.50	34.00	36.00	39.00	39.00
No. 2 Foundry Birmingham	$14.00	14 00	13.70	13 65	13.75	13 50	13 00	14.15	16 00	17.15	21 25	22.00

1907

	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$26.00	26.50	26.75	27.50	27 40	26.50	25.40	24.50	23.60	22.60	20.60	19.00
Gray Forge Cincinnati	$22 60	22.50	22.70	21.50	21 90	21.35	20.55	19.95	18.85	18.45	17.35	15.50
Plates Chicago	$35.30	37 30	37.30	37.30	39.40	39.60	39.60	39.60	36.60	37.60	37.60	37.00
Billets (Bess.) Pittsburgh	$29.75	29.50	29.25	29.75	30.25	31.00	30.00	30.00	29.50	28.50	28.00	28.00
Bessemer Pig Pittsburgh	$22.92	22.78	22.85	22 16	24.10	24.10	23.30	22.90	22.90	22.80	20.60	19.90
Beams Pittsburgh	$34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.05	34.00
Bar Iron Cleveland	$39.00	36.50	36.00	36.00	35.00	34 00	34.00	33.00	33.00	32.50	31.00	31 00
No. 2 Foundry Birmingham	$23 00	23 00	22 75	22 00	21 40	21 25	20 50	19 80	18 12	17.65	16.00	14.91

1908

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.		Dec.
No. 2 Foundry Chicago	$18.24	17.87	17.42	17.21	17.00	17 31	17 00	17.00	16 75	16 50	16..5	17.35
Gray Forge Cincinnati	$14.45	14.06	13.63	13.60	13.50	13 75	13.70	14 00	14 25	14.25	14 25	14.75
Plates Chicago	$37.60	37 60	37.60	37.60	37.60	36 60	35 60	35.60	35 60	35.60	35 60	35 60
Billets (Bess.) Pittsburgh	$28 00	28.00	28.00	28.00	28.00	26 50	25 00	25 00	25 00	25 00	25 00	25 00
Bessemer Pig Pittsburgh	$19.00	17.90	17.86	17.49	16.92	16 90	16 73	16 11	15 90	15.48	16 74	17 40
Beams Pittsburgh	$34.00	34.00	34.00	34.00	34.00	33 00	32 00	32 00	32 00	32 00	32.00	32.00
Bar Iron Cleveland	$28.80	27.00	28.00	28.40	30.00	29 00	29 00	29 00	29 00	29 00	29 00	29.00
No. 2 Foundry Birmingham	$12 80	12 50	12.12	11 90	11 50	12 00	11 60	12.06	12 50	12 50	12 50	13 00

1909

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$17.44	16.75	16.50	16.46	16.21	16.41	16.90	17.37	18.20	18.87	19.00	19.00
Gray Forge Cincinnati	$14.75	14.62	13.50	13.25	13.31	13.50	13.95	14 62	15 25	16.62	16 75	16.75
Plates Chicago	$35.60	34.10	29.60	28.60	28 95	28.60	30.60	31 60	32 80	33.60	35 60	35.60
Billets (Bess.) Pittsburgh	$25.00	23.50	23.00	22.00	22 50	23.00	24.00	25 00	26 00	26 50	27 50	27 50
Bessemer Pig Pittsburgh	$17.34	16.78	16.34	15.80	15 48	16.13	16 37	17.13	18 33	19 68	19.90	19.90
Beams Pittsburgh	$32.00	29.00	26.00	24.00	25.00	26 00	27.00	28 00	30 00	30 00	31.00	32 00
Bar Iron Cleveland	$29.00	28.75	26 20	25.25	25.00	26 00	29.25	30 00	30 00	30 00	32 00	32 00
No. 2 Foundry Birmingham	$13.00	12.70	11 75	11.00	11 00	11 31	12 30	13 00	14 00	14.50	14 50	14.00

1910

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$19.00	18.75	18.25	17.00	16.75	16 50	16 50	16.50	16 50	16 00	16.00	16.00
Gray Forge Cincinnati	$16.50	16.38	15.75	14.88	14.56	14.35	14.12	13.75	13.75	13.75	13.75	13 75
Plates Chicago	$35.60	35.60	34.60	33.60	33 60	32.60	31.60	31 60	31 60	31 60	30.60	30.60
Billets (Bess.) Pittsburgh	$27.87	27.50	27.50	27.00	26.12	25.50	25.00	25 00	24.50	23.38	23.00	23 00
Bessemer Pig Pittsburgh	$19.90	19.42	18.90	18.15	17.09	16.73	16.40	16.21	15.90	15.90	15.90	15 90
Beams Pittsburgh	$31.00	31.00	30.40	30.00	30 00	29.20	28.20	28.00	28.00	28.00	28.00	28.00
Bar Iron Cleveland	$33.00	33.00	33.00	32 50	31.00	30.10	28.00	28.00	28.00	28.00	27.80	27.00
No. 2 Foundry Birmingham	$14.00	13 88	13.00	12.12	11.81	11.60	11.38	11.00	11.00	11.00	11 00	11.00

1911

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$15.00	15.00	15.00	15.00	15.00	15.00	15.00	14.50	14 50	14.50	14.00	14.00
Gray Forge Cincinnati	$13 35	13.25	13.15	13.05	12.90	12.50	12.05	12 05	12.05	12.00	12.00	12.00
Plates Chicago	$31.60	31 60	31.60	30.60	30.60	30.60	13 60	29.60	29.60	26.60	25.00	25.00
Billets (Bess.) Pittsburgh	$23.00	23.00	23.00	23.00	23.00	21.00	21.00	21.00	21.00	20.00	19.70	19.25
Bessemer Pig Pittsburgh	$15.90	15.90	15.90	15 90	15.90	15.90	15.90	15.90	15.90	15.39	15.10	15.15
Beams Pittsburgh	$28.00	28.00	28 00	28.00	28.00	27 00	27.00	27.00	26.40	24.00	22.60	23.25
Bar Iron Cleveland	$27.00	27.00	27.00	26.75	26.20	24.75	24.00	25.00	24.75	24.00	24.00	24.00
No. 2 Foundry Birmingham	$11.00	11 00	11.00	11.00	10.75	10.25	10.00	10.05	10.10	10.00	9.75	10.00

1912

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$14.00	14.00	14 00	14.25	14.50	14.50	14.62	15.30	16.37	17.30	17.87	18.00
Gray Forge Cincinnati	$12.50	12.50	12.50	12.50	12.85	13.00	13.50	13.90	14.75	15.70	16.18	15.75
Plates Chicago	$26.00	25.76	25.90	27.55	28.60	28.60	29.60	30.40	31.35	32.60	33.60	33.60
Billets (Bess.) Pittsburgh	$20.00	20.00	19.88	20.00	21.10	21.88	22.25	22.40	23.75	25.70	26.75	27.00
Bessemer Pig Pittsburgh	$15.15	15.00	15.02	15.15	15.15	15.15	15.15	15.43	15.93	17.75	18.05	18.15
Beams Pittsburgh	$23.00	23.00	23.00	23.40	25.00	25.00	26.00	27.40	28.60	28.60	29.00	29.00
Bar Iron Cleveland	$24.00	23.50	23.50	24.00	24.40	25.25	27.00	27.25	29.00	30.20	31.00	31.00
No. 2 Foundry Birmingham	$10.00	10.00	10.06	10.50	10.95	11.00	11.25	11.65	12.50	13.45	13.75	13.50

1913

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$18.00	18.00	17.62	17.25	16.75	16.12	15.25	15.00	15.00	15.00	15.00	14.50
Gray Forge Cincinnati	$15 75	15.25	15.25	14.25	13.50	12.75	12.75	12.75	13.25	13.25	13.00	13.25
Plates Chicago	$33.60	33.60	33.60	33.6	32.80	32.6	32.60	32.60	31.60	30.8	28.85	27.60
Billets (Bess.) Pittsburgh	$28.25	28.87	29.00	29.00	27.37	26.50	26.12	25.00	24.00	24.87	24.00	24.00
Bessemer Pig Pittsburgh	$18.15	18.15	18.17	17.92	17.90	17.26	16.65	16.52	16.65	16.60	16.05	15.90
Beams Pittsburgh	$29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	28.25	27.40	26.00	25.00
Bar Iron Cleveland	$33.00	33.00	31.00	33.00	32.50	32.00	31.20	29.25	28.25	27.40	27.00	26.00
No. 2 Foundry Birmingham	$13.70	13.50	13.00	12.50	11.75	10.60	10.50	11.00	11.00	11.00	10.75	11.00

1914

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.
No. 2 Foundry Chicago	$14.25	14.19	14 25	14.25	14.25	14.19	14.00	14.00	13.63	13.30	13.00	13.00
Gray Forge Cincinnati	$12.75	12.75	12.87	12.75	12.75	12.69	12.30	12.25	12.25	12.25	11.90	11.40
Plates Chicago	$26.60	27.35	27.60	26.36	25.80	25.60	25.60	27.35	27.35	26.04	25.00	24.00
Billets (Bess.) Pittsburgh	$20.00	20.75	21.00	20.80	20.00	19.75	19.30	20.00	21.00	20.60	19.00	18.50
Bessemer Pig Pittsburgh	$15.00	15.09	15.15	14.90	14.90	14.90	14.90	14.90	14.90	14.85	14.70	14.70
Beams Pittsburgh	$24.00	24.00	24.00	23.60	23.00	22.38	22.20	23.50	24.00	23.50	22.20	21.00
Bar Iron Cleveland	$26.00	26.00	24.75	24.60	24.00	24.00	24.00	24.00	24.00	24.00	23.75	23.00
No. 2 Foundry Birmingham	$10.50	10.50	10.60	10.50	10.50	10.44	10.05	10.00	10.00	10.00	9.88	9.50

Charts based on above prices are published as a supplement of today's issue.

The Steel Trade and The War

American Competition From a British Point of View—England and the United States to Share Trade Formerly Controlled by Germany

BY E T GOOD

INDUSTRIAL Britain and America seem to be on the eve of a new epoch in their commercial history. Industrial Germany is crippled by the war, and the probability is that not for many years after the war, if at all, will she be able to offer anything like the keen commercial competition she has in the recent past. The iron and steel trades, for example—the world's most important manufacturing industry—will be profoundly affected, and the dislocation, if not cessation, of German competition means the division of an enormous slice of business between Britain and America, for these are the only two countries in a position to undertake any great amount of the business Germany is losing. In these circumstances, it may not be amiss to call attention to the relative resources of the United Kingdom and the United States as iron and steel exporters, and little apology need be offered for presenting this brief review from a purely British standpoint.

Up to the outbreak of the war the Germans were taking nearly 7,000,000 tons of the world's total of about 18,000,000 tons of iron and steel exports a year, the British taking 5,000,000 tons, and the Americans about 2,000,000 tons, the rest of the business being divided chiefly among Belgium, France, Austria and Scandinavia. The outstanding features of steel trade history these last 10 or 20 years have been an enormous increase of production in America; a large increase in Germany; a small increase in Britain; a huge increase of exportation by Germany, accompanied by comparatively small increases by Britain and America. In this trade, it used to be Britain first, and the rest nowhere. Now America produces nearly three times as much as Britain. Germany has been, until the war broke out, producing nearly twice as much. In exports, Britain did four times as much trade as Germany only 15 years back. In the first half of this year, the Germans actually exported nearly 1,000,000 tons more than we did. While in this period British exports have advanced by 50 per cent, those of Germany have increased by 500 per cent. The steel export trade race has been between Britain and Germany, the United States, although possessing the largest productive capacity, having remained a poor third in this respect.

Now what of the future? In order to forecast this, it is necessary to take a glance backward, especially in order to see how Germany, making a late start in the competition, has so rapidly become the second country in production and the first in exportation. Germany's enormous strides in the iron, steel and engineering trades have been due to a more elaborate system of state favors, bankers' and merchants' credits and syndicate export bounties than any other nation has adopted. The government has carried goods for export on its railways and canals at about half the ordinary rates. The consular service has been specially employed in the interests of exporters. The banks have been most generous in assisting manufacturers and merchants engaged in pushing German goods abroad. The iron, coal and steel syndicates have paid almost extravagant bounties in respect of exports. By these means, German products have been sold in foreign markets below actual cost of production and upon very extended credits. It is hardly exaggeration to say that German competition has been run upon artificial credit. Now, with Germany's credit temporarily, if not permanently crippled, and her export trade avenues closed, most of the orders for iron, steel and machinery which have been going to that country—not to mention Belgium, Austria and France—will most likely be diverted to Britain and America. Certain it is that the world's great appetite for steel goods will not be permanently lessened by the war. It is equally certain that German industries cannot resume their normal course for a very long time. The question, therefore, arises: Is the United Kingdom or the United States in the better position to make a bid for the trade Germany is losing? America has vastly increased her productive capacity these late years. Britain has not. An extra two million or three million tons of steel business a year would tax our British works severely; but the plants of America might easily undertake another 8,000,000 or 10,000,000 tons.

Our lack of progress in Britain may be briefly explained in passing. After long enjoying a big and almost unchallenged lead in manufactures, we became alarmed some 15 years ago by estimates that our coal and iron reserves were coming to an end. At the same time, we were deluged with accounts of the almost fabulous natural resources of certain foreign countries, particularly America. It was declared that poor old Britain was approaching industrial bankruptcy. Concurrently, we began to feel severely the effects of German and other foreign competition. We saw our rivals making great headway. We saw our own markets flooded with bounty-fed German products. For a time, we lost faith in the old country. The result has been that while the world's demand for steel goods, and our rivals' production of them, have been increasing enormously, very little fresh capital has been invested in our British industry. Very little has been done to increase our capacity for production.

Now there is a change. We have just lately discovered that the alarmist predictions about our coal and iron reserves approaching exhaustion were baseless. We find we have an abundance of coal and plenty of convenient iron supplies. On top of this comes the sudden suspension of German competition. The world's greatest steel dumper is put out of action. We find ourselves faced with the prospect of a big increase of profitable business, free from the organized and subsidized competition from which we have so long suffered. But we have neither mills nor men enough at present to enable us to take, or re-take, that great lead in the world's steel export trade to which we feel entitled by virtue of our natural resources, geographical situation and shipping facilities. Nevertheless, we are in a position to take a considerably larger share of the business, though the United States is much better situated from the point of view of productive capacity. In America you have enormously increased the capacity of your iron and steel works these late years—you have pushed the number and size of your works to great lengths. As a result during the recent business depression, huge plants, representing hundreds of millions of dollars of capital stood idle. Your steel works have only on rare occasions been fully

employed since the financial panic of October, 1907. Now, with the suspension of German competition, comes America's golden opportunity, as it is Britain's, but with this difference: that whereas Britain has a limited producing capacity, America has a positively enormous one, of which from a third to a half is unemployed at present. Briefly, it may be said that America has any amount of plants to undertake all the business that may be available as a result of the dislocation of German industry, but is not in a good physical or geographical position, while Britain is splendidly situated physically and geographically, but is short of furnaces, mills and men. It is pretty clear, however, that the international steel trade race will be between Britain and America in the future, instead of between Britain and Germany, as in the past. This brings us to the root of the question: Can Britain or America produce and ship steel the cheaper?

Cost of Production

We have many a time been told on high authority that America could beat the world in the matter of cheap steel production. Just 15 years ago, it was calculated that the cost of producing steel-making pig iron in America was $5 a ton less than in England, and steel rails nearly $7 less. It was generally admitted that American producing costs were at levels which defied competition. For several years, it was thought that all our American rivals need do in order to annex the world's steel trade, and beat Britain and Germany clean out of the race, was simply to erect plants enough for the purpose. The Americans have, indeed, erected plants enough. They are capable of producing about 30,000,000 tons of steel in a year, but their domestic demand does not exceed about 20,000,000 tons. It is a remarkable fact, however, that just as the Americans have hugely increased their capacity so have their costs gone up substantially. It appears from the evidence tendered to the ways and means committee and the internal taxation authorities that between 1899, which was a year of activity, and 1908, which was a year of depression, be it observed, the net cost of producing pig iron in the United States increased by nearly $6 per ton, and of steel rails by nearly $7. The reasons, of course, are that mining royalties have risen largely, mining costs have increased, and the yield of iron per ton of ore has declined. Coupled with this the cost of coal and coke has gone up, and transit charges have advanced. The net result is that it is not now possible to produce iron and steel in America anywhere within 30 or 40 per cent of the economy of 12 or 15 years ago. But in our country we have experienced no such increase in costs of production. The increase in the prices of some of our raw materials has been nearly balanced by improvements in our processes. We have modernized our plants and improved our methods. Ten or 15 years ago, we were certainly out-of-date. We are now pretty well up-to-date. We can produce and ship as cheaply as any country now. The American steel industry is not in such a strong competitive condition as is generally assumed. The great handicap on United States exportation is that the coal mines are mostly a thousand miles from the iron ore reserves, and the smelting furnaces and rolling mills are generally between four and five hundred miles from a port of shipment, besides which the American ports are several thousands of miles from the world's chief markets. Also America, owing to her high standard of living, has to pay abnormally high wages. In a sentence, Britain, with her mines, furnaces and ports all practically side by side, can produce and ship cheaply, while America, with her great capacity can turn out enormous quantities of steel, but is badly situated geographically. The probability, therefore, is that we shall soon be taxed to our uttermost capacity, while the overflow of business lost to Germany will provide the Americans with a great increase of employment.

Machinery Exhibit

Arrangements have been completed for an extensive display of the hydraulic machinery products manufactured by the Hydraulic Press Mfg. Co., Mount Gilead, O., at the Panama-Pacific International Exposition, at San Francisco. The exhibit is being installed in block 11 in the Palace of Machinery. The space to be occupied is 27 feet wide and 67 feet long. The exhibit will be in charge of the company's Pacific coast representative, The Berger & Carter Co., 1045 Seventeenth street, San Francisco. A practical hydraulic expert will be in attendance at all times to operate the machinery and explain its various features.

When the outer corners or edges of the cutting lips wear, it shows that the speed is too great for that particular drill. If the corners wear at the usual speed for that size drill, that particular drill is probably a little too soft. This is particularly noticeable in drilling cast iron.

Thermit to Start Furnace

Electric furnaces, it is stated in a recent issue of *Reactions,* as a general rule are started by pouring in steel from another furnace in order to complete the electrical circuit. It happened, however, that a new furnace was erected at the plant of the Eastern Metal Corporation, Bayonne, N. J., where no liquid steel was available, and two attempts were made to start it in operation without using molten metal.

Trouble was immediately experienced in the fact that the metal to be melted lay in the form of a figure eight around two vertical magnets in the furnace, and although two metal rings were used around each magnet with the metal to be melted packed around these rings, the electric circuit while closed at first would be broken when the metal melted down and fell away from the rings. It was thought that the steel rings would complete the metallic circuit and bring the pieces to be melted, as well as the rings themselves, gradually to a molten heat, at which time, of course, the rings would be melted down with the other material.

After the first unsuccessful attempt to start the furnace, the lining was removed at conisderable expense and the entire charge taken out. A second attempt was then made to start the furnace in the same way, but without success. It then occurred to the engineers in charge of the work that probably Thermit would be suitable for starting the furnace going, as the Thermit on reaction would give half its weight in liquid steel and as the reaction would last only half a minute they would be able to obtain all the steel needed at practically a moment's notice.

An operator was accordingly sent to the furnace plant with 900 pounds of Thermit, of which 400 pounds were inserted through one charging hole and 400 through the charging hole on the opposite side. Smaller charges of about 25 pounds each were inserted through the other openings in the furnace. The two large charges were then ignited by means of ignition powder and it was found on reaction that sufficient steel had been formed to start the furnace successfully and it has been in operation without a hitch ever since.

It is hardly to be expected that the process will be called on very often for work of this kind, as usually furnaces are set up where molten steel is available and after a furnace is once in operation no trouble is ever experienced thereafter, as the furnace does not completely empty itself and enough steel is always left to complete the metallic circuit and take care of new charges.

Cincinnati Market's Gloomy Year

With One Bright Feature in Pig Iron Activity

Which Developed Late in November—Reduction in Freight Rate From Birmingham—Lake Furnaces Fail to Sell Iron in Competition With Ironton Stacks

BY S G BACKMAN

THE Cincinnati pig iron situation in 1914 keenly disappointed producers and the year was one of the most discouraging in the history of the market. Even in 1908, which was one of the worst years in the history of the trade, more iron was sold in proportion to the amount produced than was the case in 1914. During the year just passed, 11 of the 12 months were characterized by extreme inactivity in buying and selling, and by weakness and almost continued decline in prices. The one bright feature of the year was the buying movement that developed late in November and early in December. At that time, several furnaces quietly dropped their prices from 25 to 50 cents below market quotations, and melters, eager to close for the first half of 1915, on account of being short of stocks, immediately took advantage of the situation with the result that within a few weeks an extremely large tonnage had been contracted for. Shortly after the first of December, this buying movement began to drop away, until at the close of the year the market had lapsed back again into its former quiet state.

At the beginning of 1914, the southern market was very uncertain. The year 1913 had closed with a very quiet month and with prices comparatively weak. Dealers, however, were of the opinion that with the advent of the new year business would again become better and prices correspondingly strengthened. This did not develop, but on the contrary from Jan. 1 on through the entire year until November, the market was stagnant and sales were limited to small lots which were obtained more from solicitation by salesmen than from general inquiries. The price of southern No. 2 foundry, on Jan. 1, 1914, was $10.50, Birmingham basis. At the beginning of 1913, this price was $13, Birmingham basis. It was therefore thought at the beginning of 1914 prices were almost at rock bottom. This seemed true, when during the latter part of March the price was advanced to $10.75, Birmingham basis, for No. 2 foundry, but this condition did not prevail long, and early in April quotations sagged back again to the $10.50 basis. The situation then remained unchanged until late in June, when the first decline took place and the price for southern No. 2 foundry, dropped to $10.25, Birmingham basis. Even this price did not hold very long, for within two weeks, or early in July, $10, Birmingham basis, for this grade became the prevailing figure and continued as such until early in December, when the low point of $9.50, Birmingham basis, for No. 2 foundry was reached. This price continued to be quoted until the end of the year. The southern market, therefore, suffered three permanent and decisive declines during the year, and only one short and temporary advance. The decline in price of southern No. 2 foundry from Jan. 1 until the last of December was $1 per ton, as the market began the first of the year at $10.50, Birmingham basis, and ended the same year at $9.50, Birmingham basis.

Prices of Southern Iron

	Average minimum price, Birmingham basis.	Average price, Birmingham basis.
January	$10.50	$10.75
February	10.50	10.75
March	10.60	10.80
April	10.50	10.75
May	10.50	10.75
June	10.44	10.69
July	10.05	10.28
August	10.00	10.25
September	10.00	10.25
October	10.00	10.25
November	9.88	10.07
December	9.50	9.75

Southern Ohio Iron

	Average minimum price Ironton basis.	Average price Ironton basis.
January	$13.00	$13.25
February	13.00	13.25
March	13.25	13.38
April	13.50	13.50
May	13.50	13.50
June	13.50	13.50
July	13.00	13.25
August	13.50	13.50
September	13.00	13.25
October	13.00	13.25
November	12.63	12.94
December	12.63	12.94

The lowest price for southern No. 2 foundry iron in 1913 was $10, Birmingham basis, which prevailed in the latter part of the year. In 1914, the low level reached was $9.50, Birmingham basis, for this grade which also occurred late in December. This price of $9.50 was the lowest reached by southern No. 2 foundry since 1898, when it sold at about $7.75, Birmingham basis. However, early in 1899 a gradual advance took place until $18, Birmingham basis, was reached and it has never again dropped below the $10 mark until December, 1914. Owing to the fact that transactions were so few and limited to such small tonnages, the market in 1914 was always in an uncertain condition. Furnaces, too, would occasionally come into the market and take good sized tonnages at figures slightly below general quotations, and then refuse to sell any more iron, which kept buyers in doubt the greater part of the time. Unlike 1913, the Tennessee furnaces were not always the lowest sellers of southern iron. Sometimes an Alabama producer would secretly underbid the market and then quietly retire with well filled order books. This custom was also occasionally followed by Tennessee producers and had much to do with the gradual decline in prices.

It has always been considered by the market here that southern pig iron could not be sold below $10, Birmingham basis, and a profit realized. Much doubt therefore arose with the quoting of a $9.50 price as to just why certain furnaces made this move. It has gradually developed that these producers have figured costs for next year cheaper than in 1914, because they expect to pay less for ore and coke, and also to obtain cheaper labor in 1915, thereby reducing proportionately the cost of making iron.

Reduction in Freight Rate

One of the principal developments of the year in the southern market from the buyers' standpoint was the reduction, late in October, of 35 cents per ton in the pig iron rate from Birmingham to certain points in that territory. The former rate had been $3.25 from Birmingham to Cincinnati, but by an order from the interstate com-

(*Continued on page* 106b.)

War Rescues Machinery Market

Tremendous Purchases of Belligerent Nations Make Tool Builders Plants Active—Hope for Railroad Buying as Year Closes

OF THE outstanding features to be noted in a review of the machinery market during 1914, the one of most immediate importance is the decision handed down by the interstate commerce commission in December, whereby eastern railroads are permitted to advance their freight rates almost horizontally by 5 per cent in the territory east of the Mississippi and north of the Ohio and Potomac rivers. While the volume of buying by the railroads has been greater than is generally known, due to the secrecy imposed on sellers by the buyers, it nevertheless, has been far below normal. All through the year the railroads have followed a policy of rigid retrenchment, based on the ground that until their income became greater they could not feel justified in making expenditures for new equipment except in cases of absolute necessity. The decision, therefore, has served to cheer manufacturers of machinery and all kinds of railroad supplies and equipment, since the excuse most customarily offered by the railroads for postponing their buying has been removed. As almost all the railroads in the country are urgently in need of equipment of all kinds, it confidently is expected that railroad buying shortly will show a decided improvement.

Effects of the War

Then, too, at the close of the year, manufacturers of machine tools were in a more comfortable position as a result of the war in Europe. When the war broke out in the latter part of July, the belligerent nations found themselves in great need of such machinery as is required for making munitions of war, and as a result there developed a demand of large proportions for machine tools of all kinds. The extent of this demand is indicated by custom house returns for October and November, which show that in exports of metal working machinery these months rank among the largest on record. So large was the foreign demand for lathes that stocks of the smaller sizes, from 14 to 20-inch swing, have been practically wiped out. Next to lathes, automatic screw machines were in heavy demand. Of smaller proportions was the demand for turret lathes, drill presses, milling machines and other machine tools. This buying of machine tools by the belligerent powers, although not so active as in the month or two immediately following the outbreak of the war, by no means has abated.

Indirectly, the war caused an even greater improvement in the machinery market in this country. There has been a rather large demand and an active inquiry from non-combatant foreign countries all over the world for machinery which under ordinary circumstances would be bought in Germany or England. Particularly have our machinery markets expanded in Norway, Sweden, Italy, Spain, Japan, Australia, and in the countries along the Mediterranean. There has been only a slight improvement in the demand from South America, due to business conditions, which, in some of the countries on that continent, are almost chaotic.

A most important indirect effect of the war also is found in the buying of all kinds of machinery on a large scale by such concerns as have booked contracts from the warring nations for munitions of war and supplies. Almost all the manufacturers of firearms and ammunition, for example, are or have been large buyers of machinery as a result of having booked such contracts. The Bethlehem Steel Co., which booked a large foreign contract for shrapnel and field guns, was the largest single buyer of the year. The E. W. Bliss Co., which booked a large shrapnel contract, also was a large buyer. All the manufacturers who bought machinery as a result of such foreign contracts are too numerous to mention. It appears, however, that most of the buying of this kind still remains to be done.

With the exception of the activity originating in the requirements of the countries engaged in the war, demand for machinery was below normal, due to the depression which prevailed in most lines of business during the year. Electrical manufacturers, for instance, who usually are among the most liberal buyers of machine tools, bought very sparingly. Automobile manufacturers were comparatively active buyers but even these interests did not enter the market on anything like a normal scale. During the year a great many concerns of all kinds inquired for prices on machinery; most of these lists still are pending, action on a number of them being expected no later than spring. As is usual when business is poor, buyers during the year showed a preference for second hand machinery. A feature of the year was the demand for machinery for technical and manual training schools, which, while not especially large in the aggregate, indicated that this field is one of increasing opportunities to the machinery salesman. The government also was a fairly active buyer during the year.

Export statistics show that up to the outbreak of the war, demand from abroad for adding machines, elevating machinery, electric locomotives, marine gasoline engines, paper mill machinery and woodworking machinery had increased, while the call from abroad for air compressors, traction engines, flour mill machinery, mining machinery and sugar machinery had decreased. The export movement in pumps, refrigerating machinery and printing presses showed approximately no change from the movement in 1913. After the commencement of the war, exports of all kinds of machinery, as indeed was the case with all commodities, fell off almost to the vanishing point. By December, exports of stationary steam engines, mining machinery, oil well machinery and sugar machinery had resumed normal proportions; metal working machinery was the only classification under machinery in which exports had out-stripped normal.

Busy in Cincinnati

In Cincinnati, machine tool builders during the last few months of 1914 experienced some of the best orders in their history. These were the result of the European war, which immediately developed heavy inquiries from England, France, Germany, Russia and Italy and occasionally from Norway and Sweden. The inquiries were principally for lathes, but radial drills also sold in large lots and toward the end of the year several good orders for planers were taken. A demand for shapers never was realized and the market for these machines was quiet throughout the year. During the first three quarters of the year the market was as featureless as at any time in its history and makers of all kinds of tools in a large number of cases were forced to curtail production. A large number of shops closed down because of lack of orders and the situation as a whole was very discouraging. This was because of the very small demand from both domestic and foreign sources.

Domestic demand did not improve at any time during the year and practically all the heavy orders taken during the

(*Continued on page* 106)

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Ford Motor Co., Berger Mfg. Co., J. T. Ryerson & Co., Youngstown Sheet & Tube Co., Atlas Drop Forge Co., Mark Mfg. Co., Illinois Central R. R. Co., Pennsylvania R. R. Co., Chicago & North-Western R. R. Co., Thew Automatic Shovel Co., Standard Malleable Iron Co., Chain Belt Co., Danville Malleable Iron Co., and we can name innumerable others.

These concerns all selected Ayer & Lord Interior Wood Blocks because they wished to insure themselves the most **wearproof, dustless, sanitary** and **silent** flooring.

Write today for our little booklet, **"FLOORING".**

The illustration above shows an installation of Ayer & Lord Interior Wood Blocks in the annealing room of the Lakeside Malleable Casting Company, Racine, Wis. Note the heavy three-wheeled charging buggy.

The flooring comes to within two feet of the furnaces, and the pots are built up on the floor, filled with castings, put into the furnaces, then taken out while hot and dismantled on the floor.

In spite of all this the blocks do not show char.

We'll be glad to send you full particulars.

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

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KANSAS CITY, MO.—1117 Rialto Bldg.
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War Rescues Machinery Market

(*Continued from page* 104.)

last quarter were from European countries. In August the stock of machine tools in Cincinnati shops was heavy enough to supply the usual demand for over two years if no more tools were manufactured, and was one of the largest that the manufacturers had ever carried. This supply, however, soon was exhausted after the war began because of the demand for immediate shipment. At present, manufacturers of lathes, radial drills and planers, especially the two former, are working full force with occasional night shifts and some have enough orders on hand to run them until March 1. It is estimated that over 1,000 lathes have been sold by Cincinnati manufacturers alone to European countries. The outlook for continued business from Europe is good as new inquiries are continually coming in for large and varied lots.

Quiet in Chicago

The machine tool trade in Chicago has not found the past year prosperous. Business began to fall off during the latter part of 1913 and this decline became greater in 1914. Coincident with the decrease in demand for various manufactured products, shops of all kinds curtailed their production and operated on a low basis. Under these circumstances they delayed adding to or renewing equipment as far as possible. Such sales as were made for the most part were single tools to meet pressing necessities and economy was practiced in every line where existing equipment could be made to meet requirements. Railroads continued their policy of buying only as they absolutely needed and during the entire year not a comprehensive list was issued in the Chicago territory. One feature of the year was an increased proportion of sales of second hand machinery, indicating the extent to which economy of operation and equipment was being practiced. As a general thing such buying as was done came from small shops, well scattered over the country and the larger concerns apparently contented themselves with such machinery as they already had in operation. Increased business which came to some localities as a result of the European war had comparatively little effect on the Chicago market inasmuch as the latter is not a manufacturing point for machine tools. The principal result noted in Chicago was that many machines on the floors were called in to assist in making up shipments to foreign countries.

Machine tool manufacturers in Milwaukee and northern Illinois received considerable benefit from the demand resulting from the war and foreign business with these manufacturers late in the year was much larger than had been expected. Shops were speeded up and large shipments were made to almost every country in Europe which is engaged in the great struggle.

A Better Outlook at Pittsburgh

Conditions in the market for machine tools and rolling mill equipment in the Greater Pittsburgh district in 1914 were much the same as those at other centers. The year opened unfavorably. Sales during the first six months were about 50 per cent of those in previous normal years, and much equipment was offered at sacrifice prices. Conditions grew worse immediately after June 30. Inquiries became scarcer, and many prospective buyers withdrew from the market, hesitating to make purchases because of the uncertainty. Sales to domestic consumers in the third and fourth quarters fell considerably below those of the first half, and prices were even more unattractive than those obtained the early part of the 12-month period. While the war in Europe created a heavy demand at some centers, yet makers of tools and equipment at Pittsburgh were not directly benefited.

Some of the more prominent steel making interests, which usually play an important part in the market, did not spend more than 20 or 25 per cent of their usual appropriations in 1914. There was no great increase in steel making capacity in the immediate district, which helped to restrict buying. Rolling mill and machinery builders at Pittsburgh will furnish considerable equipment for a new plant at Massillon, and it is probable a Youngstown concern will figure in the Pittsburgh market shortly for machinery and equipment requirements for a new open-hearth steel plant.

Jobbers look forward to a more satisfactory market in 1915. Steel producers and the railways are expected to contribute to a rather general buying movement, and indications are that prices will be more remunerative than in the year just ended.

Our Exports of Metal-Working Machinery

July, 1913.....	$ 951,516	
Aug.	1,113,077	
Sept.	928,411	
Oct.	1,222,047	
Nov.	691,570	
Dec.	1,196,234	
Total for 6 mths.		$6,102,855
Jan., 1914.....	781,963	
Feb.	959,904	
Mar.	905,352	
Apr.	1,186,691	
May	1,116,366	
June	881,376	
Total for 6 mths.		5,831,652
July, 1914.....	702,033	
Aug.	183,594	
Sep.	451,714	
Oct.	1,966,403	
Nov.	1,679,594	
Total for 5 mths.		4,983,338

Issues New Catalog

The E. W. Bliss Co., New York, in a recent 840-page catalog gives a number of interesting facts relative to this company's growth since its organization in 1857. This is the 14th edition of the company's catalog and is devoted to its line of presses, dies, punches, shears, slitters, trimmers, double seaming machines, spinning lathes, drop-forging equipment, automatic tin-can machinery and special machines for working sheet metal. The 13th edition of the company's catalog was issued in 1906. The new catalog is very complete and contains hundreds of illustrations of the various types of equipment manufactured by the Bliss company as well as descriptive matter that will be found of value in specifying the various types of machines. A number of pages are devoted to valuable tables. The book is very completely indexed and any type of equipment can be found readily.

Boiler Feed Regulator

The McDonough Automatic Regulator Co., Detroit, recently placed a new thermostatically controlled boiler feed regulator on the market, the main purpose of which is not only to secure a continuous feed, but a positive automatic control of the feed varying with the load on the boiler. In addition, the device is designed to maintain the water level within the limits best suited for constant maximum boiler capacity, efficiency and uniformity of operating conditions. The regulator consists of a special feed valve, two headers and two expansion tubes connected with a rigid linkage to the feed valve stem. The use of two expansion tubes, it is said, doubles the expansive force and the levers transmit the motion to the feed valve in a ratio of five to one. Accurate adjustment is provided by a turnbuckle and pointer indicator.

Grinding in the lathe is not a good practice unless it is absolutely necessary. Don't forget that the abrasive is just as willing to cut on the lathe shears as anywhere else. All places look alike when it comes to cutting and scratching.

Kreolite Floors

A Guaranteed Investment for any Metal Working Plant

Kreolite Wood Block Floor in Machine Shops of Michigan Central Ry., St. Thomas, Ontario. The Arnold Co., Engineers, Chicago, Ill.

KREOLITE WOOD BLOCK FLOORS increase shop efficiency, have practically no maintenance expense, and will outwear any other type of floor except iron plates.

THE above statement is strong, but its truth will be affirmed by hundreds of industrial concerns who now have Kreolite Wood Block Floors seeing service in their various plants.

THE ARNOLD COMPANY, engineers for the building shown above, after investigating the many kinds of floor construction, decided that a Kreolite Wood Block Floor would best serve their purpose.

THE fact that Kreolite Wood Block Floors are not only extremely durable, but present a good, smooth surface for trucking, and are also very comfortable for the workmen, has caused their use on an efficiency basis.

We have some interesting views and information. A line today will bring it.

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Specialties → Blued and Polished Steel, Deep Drawing Steel, Automobile Sheets, Full Finished Enameling and Ceiling Stock, Etc.

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New York Office: 30 Church Street

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THE FALLS RIVET CO.
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Detroit Representative: Mr. H. Temple Barber, Ford Bldg.
Chicago Representative: Theo. Geissman & Co., McCormick Bldg.
St. Louis, Mo., Representative: Heimbuecher Metal Products Co., 514 N. 3d St.

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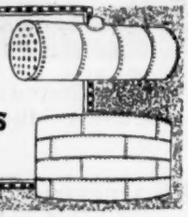

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DETROIT, MICHIGAN

Manufacturers of a general line of regular and special alloy steel castings from one pound to five tons.

Cincinnati Market's Gloomy Year

(*Continued from page* 103)

merce commission following its decision in the case of the Sloss-Sheffield Steel & Iron Co., this rate became $2.90. Much dispute arose at first, as only those railroads specifically designated by the interstate commerce commission reduced their rates, but others not mentioned refused to do so. Therefore certain towns and cities in Ohio, Indiana and Illinois, which were not on the routes of the railroads specifically designated by the commission, were still forced to pay $3.25 per ton freight rate on their iron. This, however, was adjusted within a few weeks, and in general to the satisfaction of all the parties interested.

A large number of furnaces were blown out throughout the south in 1914. Despite this, a large amount of iron was piled in furnace yards. Since furnace production was lessened during the last half by the blowing out of certain stacks, more iron was piled during the first half than during the last six months of the year. At the end of 1914, there were approximately 300,000 tons of iron piled in furnace yards in Alabama, and 50,000 tons in furnace yards in Tennessee, making a total in all of 350,000 tons of pig iron furnace stocks in the south at the beginning of 1915. On Jan. 1, 1913, there were about 75,000 tons piled by Alabama furnaces, and on Dec. 31, 1913, this amount had been increased to approximately 140,000 or 150,000 tons, making an increase of about 75,000 tons during the year.

Furnaces in blast in Alabama at the end of 1914 were as follows: One, Sloss-Sheffield Steel & Iron Co., Birmingham, and one at Sheffield; three, Woodward Iron Co., Birmingham; six, Tennessee Coal, Iron & Railroad Co., Birmingham; two, Republic Iron & Steel Co., Birmingham; Tuscaloosa, Central Iron & Coal Co., Tuscaloosa; Clifton, Alabama Co., Ironaton, and Alabama City, Gulf States Steel Co. In Tennessee the following furnaces were in blast: Napier, Napier Iron Works, Nashville; one Rockwood, Roane Iron Co., Rockwood; La Follette, La Follette Iron Co., La Follette, and Cranberry, Cranberry Furnace Co., Johnson City.

Southern Ohio Market

The southern Ohio pig iron market was more steady in its advances and declines during 1914 than was the southern market. The price of southern Ohio No. 2 foundry at the beginning of 1914 was $13, Ironton basis, in comparison with $17 at the beginning of 1913. The price of $13 prevailed until late in March, when the quotation was advanced to $13.50, Ironton basis, for No. 2 foundry. This remained unchanged until early in July, or a period of four months, when it again declined to $13, Ironton basis. The price then remained stationary until early in August, when it was advanced again to $13.50, but only for a short time, as it soon dropped to $13 early in September and remained at this figure until early in December, when the low point of $12.75, Ironton basis, for southern Ohio No. 2 foundry was reached. The market therefore suffered three declines during the year and realized two advances. The average decline for the year was 25 cents per ton, southern Ohio No. 2 foundry having begun the year at $13 and closed at $12.75, Ironton basis, which is a much better showing than that made by southern iron.

Sales and inquiries for southern Ohio foundry iron were never heavy throughout the year, but a good tonnage was sold in small and fair sized lots, principally through solicitation by salesmen. General inquiries were very few and mostly of a secret nature. The heaviest buying, as usual, was done by the Newport Rolling Mill

Co., Newport, Ky.; the Portsmouth Steel Co., Portsmouth, O., and the American Rolling Mill Co., Middletown, O., all of which bought basic iron several times during the year, the aggregate of each being about 30,000 or 40,000 tons. Southern Ohio furnaces took a large part of this tonnage, a portion of which went to the Columbus Iron & Steel Co.

Lake furnaces did not invade the Cincinnati territory in 1914, principally because of the low price that prevailed and the small tonnages of the general inquiries that were upon the market. In 1912, Cleveland producers at times easily underbid those in southern Ohio and took several good orders for basic iron that had generally gone to furnaces in the Ironton district. Northern and southern Ohio iron at that time, however, was quoted several dollars a ton above any price that prevailed during 1914, and the profit thus realized in 1912 by these lake producers was enough to counterbalance the excessive freight rates. During the year just passed, the low margin of profit that could be gained from selling at $14.20, Cincinnati, for No. 2 foundry, was not an inducement to invade this territory, and so this business was left almost entirely to the Columbus and southern Ohio stacks. Very little southern basic iron was sold to melters in this territory in 1914.

Furnace Stocks

Furnace stocks in southern Ohio and Ashland, Ky., in December, 1914, aggregated about 120,000 tons, of which 75,000 tons were foundry, malleable and basic grades, with the largest proportion foundry iron, and 45,000 tons silvery iron. This includes the 15,000 or 20,000 tons in Columbus, O., furnace yards. At the beginning of 1914, there were about 55,000 tons of foundry, malleable and basic iron piled by southern Ohio furnaces, and about 15,000 tons of silvery iron, making a total in all of 70,000 tons. This shows an increase of about 50,000 tons of foundry, malleable, basic and silvery iron during 1914, or an increase of about 20,000 tons of foundry, malleable and basic, and of about 30,000 tons of silvery iron, stocks of the latter having been practically doubled during 1914.

At the close of 1914, the following furnaces were in blast in the southern Ohio district: Globe, Globe Iron Co., Jackson, O., silvery; Belfont, Belfont Iron Works Co., Ironton, O., bessemer; Lawrence, Marting Iron & Steel Co., Ironton, O., basic and malleable; Norton, Norton Iron Works, Ashland, Ky., bessemer, and one stack of the Ashland Iron & Mining Co., Ashland, Ky., silvery.

The close of the year finds the Cincinnati market in a very quiet state, with sales and general inquiries at a minimum. At this time of the year, as is always the case, melters are taking inventory, and cannot be induced to become interested in buying, except for occasional small purchases as requirements demand. There is much speculation as to whether or not pig iron prices have struck rock bottom or whether they will continue to decline to $9, Birmingham basis, for southern No. 2 foundry, and $12.50, Ironton basis, for southern Ohio No. 2 foundry, in 1915. As far as can be learned, no iron has been sold in this territory below $9.50, Birmingham basis, and $12.75, Ironton basis, although rumors that are always current in connection with a declining market have come forward from time to time of sales below these figures. It is probably true that most melters in this territory covered for their requirements for several months during the heavy buying movement late in November and early in December, and only attractive prices could induce them to take additional tonnages until late in the first half.

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OF THE BEST QUALITY ARE OUR SPECIALTY. WRITE US.
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Of HIGH TENSILE STRENGTH and EXCEEDINGLY TOUGH *Large or small*, we are equipped to make your castings, and guarantee complete satisfaction It is our business to serve you. Quick delivery our specialty *Write us*
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